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THE AMERICAN GAS LIGHT JOURNAL

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CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

Briefly Told..... 217

Mr. Tarbell Resumes his Old Position—Something More about that Wonderful New Bedford Gas Company—New Holder for the St. Paul Gas Company—Notes.

The Market for Gas Securities..... 218

CORRESPONDENCE—

McGuire's Descent on St. Joseph, Mo..... 218

Internal Gas Fittings, by Mr. Robt. Robertson..... 219

Leather Belting..... 221

*Hadley's Process of Making Gas..... 221

*A New Recording Pressure Gauge, by Prof. W. H. Bristol..... 223

Boston Insurance Rules in Respect to Fire Risks of Electric Lighting..... 224

Taxation of Pipes in Public Streets..... 225

Giffard's Gas Gun..... 225

*Mitchell's Improvement in Charging and Discharging Gas Retorts 226

Alternating Current Motors for Mining Work..... 227

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 227

Sutherland Process Installed at Port Henry, N. Y.—And at Waterville, N. Y.—Extracts from Laws of New York Regarding Gas Supply—Cooking by Gas, Augusta, Ga.—Mr. Kitson Brings Suit—Gas Company for Palmyra, Mo.—Lighting Situation, New Bedford, Mass.—Public Lighting, Saratoga, N. Y.—Caught Stealing—An Electric Department for Topeka, Kas.—Capital Stock Increased, Clinton, Mass.—Annual Meeting, Gloucester City (N. J.) Electric Company—Improvements at Las Vegas, N. M.—The Situation at Methuen, Mass.—And Many Other Items.

BRIEFLY TOLD.

MR. TARBELL RESUMES HIS OLD POSITION.—Something like 3 years ago Mr. A. W. Tarbell, much to the surprise of his friends, severed his relations with the Waltham (Mass.) Gas Company, in whose service he had been for some time. Much speculation was indulged in at the time as to the causes which prompted that determination; but to his credit be it said, Mr. Tarbell kept his own counsel, going no further in explanation than to say that time would show whether he or the Company was right in respect to the matters in dispute between them. Of course it was patent that it was lack of harmony in some respect or another that caused his retirement from the Company, in that he still engaged in the active pursuit of his profession elsewhere. We are more than pleased, then, to chronicle now the fact that Mr. Tarbell has been re-engaged by the Waltham Gas Company, succeeding there Mr. Ralph Woodward, whose resignation was reported in our last issue; for this appointment goes to show that Mr. Tarbell has been vindicated (if such a thing was necessary) most completely.

SOMETHING MORE ABOUT THAT WONDERFUL NEW BEDFORD GAS COMPANY.—The developments in the instance of the "Non-Explosive and Sanitary Gas Company," of New Bedford, are more and more surprising; and, from the latest reports from the Whaling City regarding its progress, we must conclude that the acme of gas making has been reached. Of this, however, we leave our readers to form their own opinion, merely assisting them with evidence, in the shape of the following, from a recent issue of the New Bedford *Standard:* "The Company makes no secret of the manufacture of the gas, and explained to the reporter the whole process. The gas is made from crude petroleum, by a very simple process, and consequently is cheap and healthy. A residue of oil, of a reddish-yellow tint, is left, which drips from the pipes as the process is carried on, and which proves to be very valuable for mechanical uses. Messrs. Babbitt & Wood, who have tried it, say that what they have used, about 1 pint, went as far as 3 or 4 gallons of sperm oil would in working iron. It is thought by the Company that this oil will be excellent for lubricating purposes, but it has not been fully tested for that use as yet. General Eugene de Beauharnais, the discoverer, has used it on his watch, however, with good results. This oil will sell for 2 or 3 times the cost of the crude oil used in manufacturing the gas, and will more than pay for the cost of manufacturing, and the gas can, therefore, be furnished to consumers at a lower price than it has ever been possible to furnish coal gas. The Company claims that the gas has greater compressibility than any other, it being possible to compress 20 cubic feet into 1. It expects, on account of this quality, to be able to tank the gas and ship it wherever wanted for use. One of the most important claims made by the Company is in regard to the sanitary or medicinal qualities of the gas. It is stated by members of the Company that a young lady of this city, afflicted for a long time with St. Vitus's dance, is improving rapidly under the effects of the gas, which she has been inhaling daily for some time. An old gentleman who has been using it for deafness for the past 10 days says his hearing is much better. Another man is trying it on his eyes, one of which has a cataract over it, and the gas is gradually removing the obstacle to his sight. Persons who are afflicted with throat and lung troubles find it beneficial to them,

and there seems to be no disease of the mucuous, or other tissues of the body, that can be reached by the gas, that it will not help." But have we not shown enough to prove that this is "the process."

THE St. Paul (Minn.) Gas Light Company has given to Capt. White, of this city, an order for a million-foot triple-lift gasholder, to be completed December 15th. The inner section is to be 126 feet in diameter, middle section 128 feet, and outer section 130 feet. Tank, 132 feet 6 inches. The iron work is being gotten out by Messrs. Bartlett, Hayward & Co., Baltimore, and the tank is being built under the personal direction of Capt. White. The work upon the tank is already commenced, and although the time is exceedingly short, the Captain is confident of his ability to complete the task on time. In addition to the holder there is also to be erected an exhauster house and steam plant, and about 2 miles of additional mains are to be put down, in order to enable the Company to keep pace with the wonderful growth of the city.

NOTES.—Garstang Bros., of Alton, Ills., are putting in two condensers at the Alton gas works, and the Kerr Murray Company, of Fort Wayne, Ind., are under contract to put in a hot tar scrubber at the same plant.——Capt. H. D. Bannister, Chief Engineer to the Loomis Gas and Electric Company, died at Ottumwa, Iowa, on the 6th inst. Deceased, who was a resident of Chicago, was engaged in directing the work of construction on the new fuel gas plant for Ottumwa, the contract for the erection of which was held by the Loomis Company.——Mr. Samuel B. H. Vance, ex Mayor of New York, and one of the original members of the firm of Mitchell, Vance & Co., of this city, who were known the country over as manufacturers of gas fixtures, died, on the 10th inst., at his country seat, Douglaston, L. I. He was very much respected, and was possessed of great force of character.——The Centralia (Ills.) Company is putting in a new gasholder.——Rumor has it that the Fort Wayne Jenney Electric Lighting Company is about to engage in the gas business at Bloomington, Ills., urging as a reason therefor that the Citizens Gas Company, of the same place, is devoting too much attention to the electric anex operated by it.

The Market for Gas Securities.

During the week operators in city gas shares were nonplussed over a decline of 2½ points in Consolidated, the weakness in which continued up to time of writing (noon, Friday), the stock being freely offered at the opening to-day at 98¼. There is no reason for the decline, other than that the bear operators seem to have the upper hand in all classes of dealings on the Exchange at the present time. In strange contrast to the weakness in the shares of the Company is the pronounced strength of the bonds (5's, registered, due in 1908, interest May and November), $8,000 of which were sold at auction last week at 106 and interest. Other city shares show no change, and the Brooklyn situation remains unchanged also. During the week we note a sale at auction of $2,000 Saratoga Gas and Electric Light Company's 6 per cent. mortgage bonds, 1907, at 85; also, $2,000 Metropolitan, 6's, 1901, city, at 111½. On August 14th, $3,832,000 first mortgage 5's, of Consumers Gas Company, of Chicago, guaranteed by the Chicago Gas Light and Coke Company, were listed on the New York Exchange. Bay State gas was firmer, on a well defined impression that the strength of the Company increases daily. Laclede common is somewhat firmer, and Baltimore Consolidated is advancing.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

McGuire's Descent on St. Joseph, Mo.

ST. JOSEPH GAS AND MFG. CO.,
ST. JOSEPH, MO., August 9th, 1890.

To the Editor AMERICAN GAS LIGHT JOURNAL:

I inclose several clippings, taken from our local papers, in reference to the St. Joseph Light and Fuel Company, of St. Joseph, Mo. As you have written at some length in previous issues of the JOURNAL, and as several statements which you then made in regard to the capitalization of these opposition companies have since come true, the clippings may be of interest to you and to your readers. From them you will see that originally the capital stock of this Fuel Gas Company was $500,000, *fully paid up*, but now it is proposed to issue bonds to the amount of $250,000, and secure the same by mortgage *on plant and property*. The Fuel Gas Company have bought a piece of ground about 1½ miles from the business part of the town, paying for same the sum of $16,800. At the present writing they have about three-quarters of a mile of pipe laid in the streets (in the outskirts), and have begun to excavate for two holder tanks—one 45 feet in diameter and 10 feet deep, the other 83 feet in diameter and 20 feet deep.

As you know, the St. Joseph Gas and Manufacturing Company's plant is one of the best equipped works in the Western country, having just been remodeled and fitted to supply with gas a city of 125,000 people. The census just taken gives us a population of 52,325 souls, so you see we will have lots of capital in the gas business in St. Joseph, Mo.

Of course you will appreciate the humor in the clipping which conveys the intimation that they will "bring several retorts of their gas here;" probably to induce some of our people to take stock in the concern. I remain yours truly, K. M. MITCHELL, Supt.

[We append the clippings forwarded by Mr. Mitchell.]

[St. Joseph *Daily Gazette* May 23, 1890.]

The Fuel Gas Plant—Articles of Incorporation Filed with the County Recorder—The Stockholders Pay Up an Even Five Hundred Thousand.

Articles of incorporation of the new Fuel Gas Company were filed with the Recorder of Deeds of Buchanan county yesterday and $500,000 in cold cash was paid into the National Bank of St. Joseph by the stockholders. The Company will commence active operations at once, and expects to have the plant in good working order by fall. The articles of incorporation, as filed, read:

Know all men by these presents: That we, whose names are hereunto subscribed, do hereby associate ourselves together for the purpose of forming a corporation under the provisions of the laws of the State of Missouri, according to the revised statutes of the State of Missouri for 1889, chapter XLII., article VII., and for that purpose state:

First—The name of this corporation shall be St. Joseph Light and Fuel Company

Second—The business of this corporation shall be conducted at St. Joseph, in the county of Buchanan, State of Missouri.

Third—The capital stock of this corporation is $500,000, divided into 5,000 shares of the par value of $100 each. The same has been bona fide subscribed and the full amount thereof actually paid in lawful money of the United States, and is in the custody of the persons hereinafter named as the first Board of Directors.

Fourth—The names and places of residence of the several shareholders, and the number of shares subscribed by each are as follows:

Name and Place of Residence.	No. Shares.
Charles McGuire, St. Joseph	800
O. M. Spencer, St. Joseph	800
J. W. Heddens, St. Joseph	800
Geo. E. Black, St. Joseph	800
John Donovan, Jr., St. Joseph	800
D. D. Burnes, Buchanan county	800
J. G. Schneider, St. Joseph	800

Fifth—The business of this corporation shall be managed by a board of directors, composed of seven directors, and the following named shareholders shall constitute the Board of Directors for the first year: Chas. McGuire. O. M. Spencer, J. W. Heddens, Geo. E. Black, John Donovan, Jr., D. D. Burnes, J. G. Schneider.

Sixth—This corporation shall continue as a body politic for the term of 50 years.

Seventh—The purposes for which this Association is formed are to acquire by assignment the rights, privileges and franchises granted to Chas. McGuire, or his assigns, by special ordinance 860 of St. Joseph, Mo., to erect, operate and maintain gas and gas fuel works under the Fahnehjelm system, or other system of making and selling water or coal gas, and doing all things desired for owning, holding, mortgaging or selling water or coal gas, and to acquire gas patents of every kind.

[St. Joseph *Daily Gazette*, June 17, 1890.]

ST. JOSEPH, MO., June 17, 1890.

Notice is hereby given that a meeting of the stockholders of the St. Joseph Light and Fuel Company will be held at the office of Green & Burnes, 105 North Third Street, in the city of St. Joseph, State of Missouri, on Monday, the 18th day of August, A. D., 1890, at 9 o'clock, A. M., for the purpose of voting upon a proposition then and there to be submitted, to issue the first mortgage bonds of this Company to the amount of $250,000, and to secure the same by mortgage on all the property of this Company. SAMUEL W. ALLERTON, President.
CHAS. MCGUIRE, Secretary.

[St. Joseph *Evening News*, August 10, 1890.]

The St. Joseph Fuel Gas Company will shortly send for several retorts filled with water gas, which they will place on exhibition here, showing how it is used both for heating and lighting.

[A Paper Read Before the North British Association of Gas Engineers.]

Internal Gas Fittings.

By Mr. Robert Robertson.

There is no necessity for an apology in bringing before the Association the subject of internal gas fittings. It is one of great importance to every gas manager; the greater part if not the whole of the everlasting complaints dinned in his ears about bad gas being due to the insufficient and badly laid pipes, the "shoddy" brackets and gasaliers, and the old burners and moons of his consumers This paper is brief. It does not fully go into the matter—my object being merely to introduce the subject, which I trust will be followed up by profitable discussion. Although important, and no doubt pressed home upon us almost daily in our several spheres of work, the subject of internal fittings has never been brought prominently before us in the discussions of our Association, no doubt from the fact that interior fittings just lie beyond the domain of the gas manager. He has control of the mains and service pipes from the works to the outside wall of the consumer's house, and there it ceases; the result being that his efforts in the way of improvement, both inside and outside the works, to give a plentiful supply of good gas to his consumers are very much handicapped by the bad internal arrangement of the pipes and fittings in their houses. There will have frequently come under your observation cases where two houses equally advantageously placed for the supply of gas (similar size of main, service pipe and meter) show a great difference in illumination—a difference due to the superior fittings in the one and the inferior fittings in the other. Of course, in the latter case, the gas is blamed; and one would almost think the consumer had the idea that a special kind of gas was sent from the works to certain customers. What is needed is that the manager should have full control of the pipes from the works to the point of combustion; and how he may attain this it is for us to find out. It is a matter beset with difficulties; but surely not insurmountable.

In the meantime all that the manager can do is to give hints and suggestions to proprietors as to how to fix their pipes and what appliances to use, so that full benefit may be derived from the gas consumed. Unfortunately, in the majority of cases, these hints are received rather suspiciously, and with looks as though the whole aim and object of the manager were to increase the gas bills. The suggestions about even a gas burner, far less as to piping and gasaliers, are regarded in the light of self-interest; while the glowing tale of the itinerant burner seller is credulously listened to, and 6d. paid freely for burners usually sold by iron mongers and gas fitters for 1d. each. In these days when paraffin oil is so cheap, and so much taste is displayed in the get-up of lamps for burning this illuminant, we must look to our laurels; for, in a number of cases, the consumers who resort to oil lamps, as being better than gas, do so because of a deficient supply.

Architects are very much to blame for existing defects. All that a gas fitter receives from him when a new house is being erected is a specification stating the number of feet of the different sizes of pipes required. No details or plan or declivities are given; and the mode of laying is left entirely to the gas fitter himself. If he has taken a job at a cheap rate, he will endeavor to use as little pipe as possible without giving much thought about the gas supply. I have been connected with the gas fitting trade for upwards of 30 years, and have had to contend with low prices; and my experience is that architects, knowing themselves next to nothing about laying gas pipes, too often leave it to the gas fitter to do as he thinks fit; and it is annoying to a proprietor, after his house has been expensively papered and painted, to have the walls cut up to remedy defects that would have been obviated had a proper plan been furnished. Of course, it cannot be expected that an architect or an overseer can be familiarly acquainted with every trade carried on under his eye during the erection of a building; and it is here that I would suggest that the services of the gas manager should be asked to give particulars as to what pipes should be used and how they should be fixed up. This necessarily entails every manager being conversant with the principles of internal gas fitting.

During my long experience as a gas fitter, and my shorter experiences as a gas manager, I have often thrown out hints and remedied the prevailing defects as far as lay in my power; but without a proper warrant my efforts have been often unavailing. We must arrive at some kind of compulsion in this matter, as is the case with our water supplies. Corporations and water companies having control of the water supply lay down laws and regulations as to the quality of material to be used in the water fittings inside buildings. The pipes must be of certain sizes and weights; and the cranes or taps or other fittings must be subjected to a standard pressure, and be stamped accordingly. I hold that similar regulations should apply to gas fittings, and that all gas taps and joints should be subjected to a like examination. In the town of Dumbarton there is a fixed standard of the sizes of pipes to be used, and unless this is conformed to the supply of gas is refused. The works there belong to the Corporation; and it is to corporation gas works that we look to take the lead in this matter, for they have considerably more power in an affair of this kind than the directors of a company.

I will now deal separately with the different parts of internal gas fittings.

Pipes.—Pipes used for gas fittings are of three kinds—viz., malleable iron, composition, and block tin. The first material is the best for mills and factories where steam power is used, as, from its hardness, it is not liable to be cut or break at the fastenings in consequence of the vibration caused by the working of the machinery. Of this sort of pipe the galvanized is superior to the other, as no rust collects inside, as is sure to do in the ordinary kind; and in course of time obstructs the gas supply.

The second kind of piping is composition, of which there are two classes—tinned and untinned. The tinned is a good article for ordinary use, and is extensively employed in country buildings. I have fitted up a great many places with it and have found it to do very well; but the use of the untinned kind I would condemn as altogether unsuitable for gas fitting purposes. It is too easily bent, and is thus always ready to "bag;" while from the softness of its nature it gathers moisture easily, and produces that disagreeable jumping of the lights often seen.

The third class of pipes are of block tin, and these are by far the best that can be used. It is hard, easily laid, rarely gathers moisture, and altogether makes a tidy piece of work. This material is often objected to as being more expensive than the others; but when weight for weight is compared it will be found that the difference is not so great as supposed, because two yards of block tin pipe weigh nearly the same as one yard of the other. I strongly recommend the use of this class of piping in preference to all others, and advise that it should be fitted up wherever possible. I had intended to give in detail the diameters of pipes most suitable for the various sizes of buildings; but as this is to be treated in the committee's report, it is needless to travel over the same ground.

Gasaliers and Brackets.—Of the variety of design and construction of gasaliers and brackets there is no end. Unfortunately a great number of those at present in the market are of a light and useless description; the joints and taps being from the very first unsound and leaky. The material is light, and lasts only a short time; and as in many cases they are got up for outward show, they prove to be more ornamental than useful. What can be expected from the gasaliers one sees advertised at the wonderful price of 4s. 6d. and upwards? There should be fewer chains and less struck work about gasaliers than are usually attached to them. I am in great favor of doing away with the sliding joints, and thus dispensing with the water-joint and the balance-weights—the former dangerous in time of frost, and the latter equally dangerous at all times. It is surprising that more accidents do not happen as the result of falling weights. The gasalier fitted with a ball-and-socket joint at the ceiling, and made of a fixed length to suit the room it is placed in, would serve all purposes as well as the more elaborate kind, and all risk of accident would be obviated. We, as gas managers, should condemn in every possible way the use of the light and faulty gasaliers and brackets which are flooding the market at the present time. Let me remark here that whatever articles are purchased for illuminating purposes it is by all means essential to get the most substantial.

Gas Moons.—Just a word about the gas moons or shades used for the ornamentation of gasaliers and brackets. There is great room for improvement in the style of moons in general use. In the majority of cases we find moons so deeply obscured as to take away from 15 to 25 per cent. of the light; while the opening at the bottom is so narrow as to cause a current to pass through the moon, and thus further reduce the illuminating power of the gas. There is necessarily a great waste of gas from these causes. Of all the defects in internal fittings this is the one most easily remedied, either by having the light bare, or, if inclined for ornament and a mellow light, using what is called the "Comet" moon—that with a wide opening at the bottom and a narrower one at the top. The former prevents the current of air from passing on to the flame, and the latter causes a deflection of the light. This mode is greatly superior to the older style, and should be brought before our customers as prominently as possible. Since beginning to collect the notes that were to form this paper, Mr. Gardner, of Glasgow, has patented an adaptation to the "Comet" moon which increases the illuminating power of the gas used, and is much the same idea as I had myself formed as to increasing the luminosity of the gas; the material, however, being of a different kind from the patented article.

Jets.—The subject of gas burners has often been brought before our Association, but I am not sure that it has borne the fruit it should have done. I think the flat-flame union-jet burner is the best for ordinary purposes; and it is the duty of all gas managers to be continually drawing the attention of their consumers to their renewal at short intervals. If the expense is an obstacle, I am satisfied it would be to the benefit of gas companies to supply them free.

In bringing these rambling remarks to a close, I trust you will excuse all deficiencies that have occurred, and fill them up by a full and free discussion upon what I consider to be one of the most important departments of our profession.

Discussion.

The President said the members had heard Mr. Robertson's able paper on a subject which interested the whole of them, and which unfortunately, in their experience, had often proved very annoying, as Mr. Robertson had pointed out. It was a subject on which there should be plenty to say, and he hoped there would be ample discussion.

Mr. Whimster (Perth) remarked that no doubt the subject was of great interest to gas managers, but he might say that he considered it to be rather beyond their province. They had heard before of rules adopted by the Corporation of Dumbarton to regulate the size of pipes. He should like to know if it was within the power of a Corporation to frame such rules. But the size of pipes was not the only thing that interfered with the consumption of gas. Mr. Robertson had referred to composition and tinned pipes as a source of jumping, but he thought gasfittings, such as brackets and lusters, were entirely beyond their province, and that they should not touch them. There was another thing which would deter him from expecting a general rule passed to this effect, and that was that if a gas manager secured a monopoly of gasfittings, it would involve him in a tremendous responsibility. Only in large towns could it be undertaken, because in a small place a gasfitter—a man with brains and experience in gasfitting—would require to be well paid. His wages of necessity must be good, and unless there was a large concern he could not get constant employment, nor anything like it. To employ a tradesman, if they did not have a steady servant, would be to involve an invidious selection which would not relieve him of his responsibiiity. But the first question was, were there many gas managers present who would undertake to fit up a house of 30 or 40 lights? A gas manager, like an architect, was not a master of all trades. He might try his hand at the whole of them from necessity, but there were few managers who had a practical knowledge of gasfitting, and therefore they could not expect a good job from them. The next thing was, that if they went in for proper material and efficient workmanship, their bill would be far higher than a tradesman's bill. Unless they had a monopoly they would be brought into competition and whipped out of the market. For these reasons he could not see his way to approve of gas managers undertaking the gasfittings of a city.

The President did not think Mr. Robertson proposed that gas managers should undertake the gasfittings in a house. It was only suggested that he should advise as to the size of the pipes. Mr. Robertson had merely commented on the quality of gasfittings, such as brackets, and so on.

Mr. Hall (St. Andrews) observed that no doubt this was a very important subject, but he thought Mr. Robertson had placed on the back of gas managers a burden which they should not bear. The fitting up of a house—especially a large one—with gas was a very difficult matter; but, like all other things, it would be done if it were paid for. There had been a great improvement in that department within the past few years. There were gasfittings and gasfittings, and there were gasfitters and gasfitters, and there were brackets and burners without number, and chandeliers, too. If they had the money they should get the right thing; there was no doubt about that. There were some gentlemen present who were makers of gasfittings, and they should be able to say something on the subject. It was not fair to condemn altogether the gasfittings when they had such a large choice in every department. It was also unfair to lay too much blame on the back of the architect. In Mr. Robertson's paper some of the expressions were rather strong. Architects now-a-days did plan and consider well the fitting up of a house. The province of a gas manager, so far as the fitting up of a house was concerned, was purely to give advice when asked. If he attempted to control the size of pipes and the kind of burners and brackets, he was immediately set down as an interested party. Mr. Hall did not think it fair to contrast the supply of gas by companies with the supply of water by corporations, because they were very different. The gas companies, through their meters, were protected, but not the water commissioners. All that gas managers had been able to do in respect of fittings had been in the shape of advice, and he found that those who wished good lights and were prepared to pay the money were always ready to receive advice. It was the small consumers who gave the most trouble. The estimates for small houses were generally cut low, and hence inferior workmanship was often given. Gasfitters thought it sufficient if they could carry the gas, but the householder was not long in finding out his mistake. The complaints which arose regarding gasfittings were not so often from good houses as from an inferior class of houses.

Mr. Smith stated that in his experience he had never had any difficulty with a respectable architect. He was always ready to put up fittings of sufficient size and good quality. He had found the greatest difficulty with small men, such as a builder who was architect and everything else in connection with a house. It was these men who did the shoddy or jerry work, and used the bad quality of pipes which Mr. Robertson referred to. Mr. Robertson told them the composition pipes, when tinned, were fairly good, but that untinned pipes led to the gathering of water, and caused jumping. Would that pipe, Mr. Smith asked, cause jumping if there was a dry meter? Was it something in the nature of the pipes that drew the water, or was it that the pipe was too soft, and bagged? He felt, like Mr. Whimster and Mr. Hall, that they should not carry more on their shoulders than they had to bear at present. If they undertook the arrangement of the internal fittings they would be dubbed as having an interest in the matter, and there was no fear of carrying out the internal fittings properly if they had good men to deal with.

Mr. McDonald (Denny) referred to Mr. Robertson's remarks respecting the quality of pipes, such as block tin and composition, and asked whether any jumping would occur if the pipes were properly laid? If the pipes were properly laid there was no more cause for water gathering in composition than in tin pipes. It often happened that the common composition pipe was laid over the joists and formed ups and downs. The gas passing through was condensed, and then they found the obnoxious jumping. But if the pipe was properly laid matters were quite different. The inspector was often a joiner or a mason, who knew nothing about gasfitting, and did not understand how a pipe should be laid. Consequently the pipe was laid down any way, without inspection, and then complaints were made about the gas. All inspectors of buildings should be able to tell a gasfitter how the pipes should be laid. Architects were often very much to blame. Mr. McDonald knew of the specifications of two churches, each of 60 lights. In the one case the architect put in a half-inch pipe, and the other used an inch and a-half pipe for the same number of lights. That fact showed that architects often knew very little about the size of pipes to put in, while if gas managers advised them they were told that architects knew more about the subject than gas managers. It might be well if the Committee showed some of the best kinds of globes for the benefit of managers from the country who did not have the same opportunity as their brethren in the towns of inspecting the most improved classes of globes.

Mr. Turnbull (Lauder) said he had often found people putting in insufficient meters. In one case he had seen a 2-light meter supplying 20 lights, while in another case, that of a 10-light meter, a $\frac{3}{8}$-pipe was led away from it. It was thus found that there was a difficulty even in giving advice.

Mr. Cheyne (Britton Ferry) remarked that he had listened with great interest to Mr. Robertson's paper, and he could say with Mr. Hall, that there were fitters and fitters. He tried to meet the small householders by fitting up their places and giving them three years to pay the money. They looked to getting their profit from the sale of gas. He disagreed with the statement made about galvanized iron pipes. They found that these galvanized pipes got corroded inside, not with rust but with a sort of fur that came away from the zinc. If they could be galvanized outside, and the inside left black, it would be an improvement, the same as mains, if they were coated outside and left uncoated inside. He had found a $\frac{1}{2}$-inch pipe pieced up with a $\frac{1}{4}$-inch pipe. They could not complain of the workmanship; but because the workmen did not have a pipe of the same size they simply took that which came handiest. He had also seen, at a cross-branch, a $\frac{3}{8}$-pipe soldered on to a $\frac{1}{2}$-inch pipe, the hole allowing the flow of gas being made by a small bradawl. He never used block tin, and he did not think he was troubled much with jumping lights. Their consumers preferred to have dry meters. He thought the great cause of a bad supply was not from the pipes but from using unions. They never used a union joint in the South. They soldered pipe to pipe, opening the pipe to receive the branch, and then blowing the joint. Another thing in internal fittings was that sometimes they would have a $\frac{1}{2}$-pipe and they came to branch off two ways. Well,

they reduced the pipe there, but in place of reducing it with a Y-piece they put on a square joint—a ¾-pipe on to a ½-inch, which at once interfered with the flow of gas. The burner man was the plague of the gas manager. His principal object was to run down the quality of the gas, and tell consumers how foul it was, and that if they took his burner the foul gas would be sent through the meter, and the good gas through the burner. He had received a circular from Mr. Gardner, of Glasgow, in regard to globes. He used a globe with a wide opening at the bottom, and six small holes round the top, which kept the flame in a heated air. There was no smoke, and the globes were not liable to break, and they got a far better light. In their place thay did all things with the blow pipe.

Mr. Hall (Montrose) said he had heard before of bad gasfittings, but he thought there was one point that had been just touched on, but had not received sufficient notice, and that was the meter. 90 per cent of their complaints were traced to the meter, and the message came to them again and again "There is something the matter with the meter." When they considered the very small orifices that the gas found its way through before it came to the point of combustion, it seemed wonderful that it should reach there at all. If they could get a proper meter for measuring gas without water they would gain a great point. They, as gas managers, knew where the water came from in the fittings, but consumers did not. Consumers thought that the water came from the gas, but they knew that the gas was thoroughly condensed before it left the works, and that the whole of the water they found deposited in the fittings came from the meter. Then the question arose, why use an instrument that gave so much trouble when they might have an instrument that would measure the gas equally well without that trouble. They had found that by introducing a dry meter the fittings required almost no attention, and that was a point they should look to more than the gasfittings. In regard to unions, he thought it was a mistake to have any brass between the joints of a pipe. They found that the choking generally took place at that point, and by cutting out the unions and putting in a dry meter the supply became almost perfect.

Mr. Hall (St. Andrews) differed from the conclusion of the last speaker. He would never join one gas pipe to another without a union. He did not believe that all the water found in the gas pipes came from the meter. His experience was very different. In fitting up a house they might have occasion to pass a gas pipe across the breast of a chimney or vent in which there was a considerable heat. The gas was heated in passing that point, and then it went to another part of the house where it was exposed to a draught. There it was condensed, and the water came from the gas itself, and not from the meter.

Mr. John M'Crae (Dundee) remarked that he should be sorry if it went forth from that meeting that they condemned the wet meter and upheld the dry one. If a house was properly fitted up any kind of meter would do, and he did not think they should adopt the dry meter simply to relieve the defects of defective fittings. His advice was to fit up a house properly, and adopt the wet meter.

Mr. Hall (Montrose) admitted that unions were necessary where they had to uncouple the pipes to blow the water out. In dealing with an old house he would put in a dry meter, but in fitting up a new house, if it was fitted up properly, it did not matter what kind of a meter was used.

Mr. Robertson, at the close of the discussion, said he was very much obliged to the members for the way in which they had received his paper, and he was pleased that it had brought out a discussion which he had no doubt would prove very profitable. The questions put by Mr Whimster, Mr. Hall, and Mr. Smith, ran pretty much on the same lines. His chief contention was that a gas manager should become acquainted with the internal fittings so that he might be able to throw out hints as to the proper sizes and the best material to be used. That was a subject which might be followed up by gas managers with a great amount of good. Mr. Hall made reference to meter fittings and gas fittings, but the one case did not bear on the other; because they had a check put upon gas consumers by meter. What he tried to bring out in the paper was to save the everlasting complaints they were always hearing about leaky joints and bad gas. If they had some test by corporations it would do a deal of good in that way. Mr. Smith spoke about a common composition pipe and he (Mr. Robertson) was asked if the tinned and untinned pipes were of the same quality, and his reply was that they were both of the same quality; only the one had received a coating of tin inside and out which protected it from moisture, and also stiffened it, there was a great difference in the hardness of common composition, and tinned pipes. There was something in the nature of the composition pipe that drew the moisture more than the tinned kind. There was one house which had been fitted up many years ago, and they cut through a certain part where the pipe was carried through a 4-inch partition. There was a jumping of lights and they thought it arose from some defect in the pipe running through the partition. Well, they cut out the pipe and put in the tinned pipe on the same level as the one they took out, and the jumping ceased.

Mr. Hall (St. Andrews)—Was the pipe of the same size as the one you took out.

Mr. Robertson—Yes. There was also the question of a five light gasalier having a small drop screw occupying something like ¼ or $\frac{3}{16}$ of an inch, a size quite insufficient for the supply of such a number of lights. They should have a meter with a capacity beyond the amount of gas used. Regarding the question of gas companies undertaking the fitting up of houses, Mr. Robertson did not think that matter could be discussed at that meeting, but it might form the subject for another paper. As to the form of couplings, he would say "never fit up a house without putting in couplings," because if there were any repairs to be made they could unclose that coupling and detach the whole arrangement. They should put in unions wherever they could, but they should always be sure they were of the proper size. He was inclined to think that the moisture did not come from the meter, and in the case he referred to could not have come from the meter.

Mr. Hall—Did Mr. Robertson ever find water in fittings with a dry meter.

Mr. Robertson—Certainly.

On the motion of the President a very hearty vote of thanks was awarded to Mr. Robertson for his interesting paper.

Leather Belting.

Architecture holds that although some writers contend that leather belting should be run with the flesh side to the pulley, while others are equally strong in their claim that it should run with the hair side to the pulley, they all agree that for general use there is a no more satisfactory or more economical driver than a good leather belt when properly adjusted to carefully balanced pulleys. It is estimated that every inch in width of good double leather belting, traveling at the rate of 500 feet per minute, will transmit 1-horse power, and that every inch in width of good single leather belting, traveling at the rate of 800 feet per minute, will transmit 1-horse power.

If the belt is allowed to accumulate dust and dirt, such accumulations will absorb the moisture of the belt and it will become hard and dry and begin to crack and slip. If the face of the pulley becomes bright and smooth, it shows that the belt is slipping, even though the eye fail to detect it otherwise. A belt can be cleaned by means of warm water applied with a stiff brush, or by holding a square-edged board against the belt while it is in slow motion. Belts should be cleaned regularly, and after cleaning a good belt dressing should be applied. A proper dressing will keep the belt soft and elastic. It will cause the belt to hug the pulley and transmit its greatest power. The use of a good belt dressing is superior in economy to any other method for correcting a slipping or slightly loose belt. The custom of tightening a belt whenever it slips is not a good one. The belt is liable to be made too tight, which heats the bearings and strains the belt. Great care, however, should be taken in preparing a belt dressing. Castor oil is an article in very general use, but experts have found that it contains an active acid principle, and is drying in its nature. The use of soap, resin, tar, etc., cannot too strongly be condemned. They are only temporary stimulants and eventually destroy the belt.

It is a wise policy to purchase first-class leather belting only, and then to give it the best of care.

Hadly's Process of Making Gas.

On August 5th U. S. Letters Patent (No. 433,784) were granted to Mr. Charles F. Hadly, of Allegheny, Pa., for an improved process of making heating gas. In his specification the inventor says:

This invention relates to certain improvements in the manufacture of heating and illuminating gas from furnace gas or the products of combustion of burning fuel in conjunction with a suitable hydrocarbon or oil.

Heretofore in the manufacture of such gas a fluid or other hydrocarbon has been employed in conjunction with air and steam which are mutually decomposed to a certain extent, and the combined gases and vapors, in connection with an additional quantity of hydrocarbon, fixed or converted into a permanent gas by retorting or subjecting the same to the further action of heat. By this process the steam necessarily intro-

duced in the initial step of the production of the gas is never wholly decomposed during such part of the process, and forms an objectionable element in the subsequent process of producing a fixed gas.

My invention, primarily, has for its object to provide for the elimination or partial elimination of the steam from the gas or products of combustion after the initial step in the process, so as to produce a dry or comparatively dry gaseous compound, which is subsequently fixed or converted into a permanent gas in connection with a suitable hydrocarbon; further, to provide an apparatus by means of which such elimination of the steam may be effected at the proper stage and by which a more uniform conversion of the mixed gases and vapors into a fixed gas may be produced, the latter result being effected by a peculiar construction of the retorts, which also adds to the durability of the said retorts.

Fig. 1.

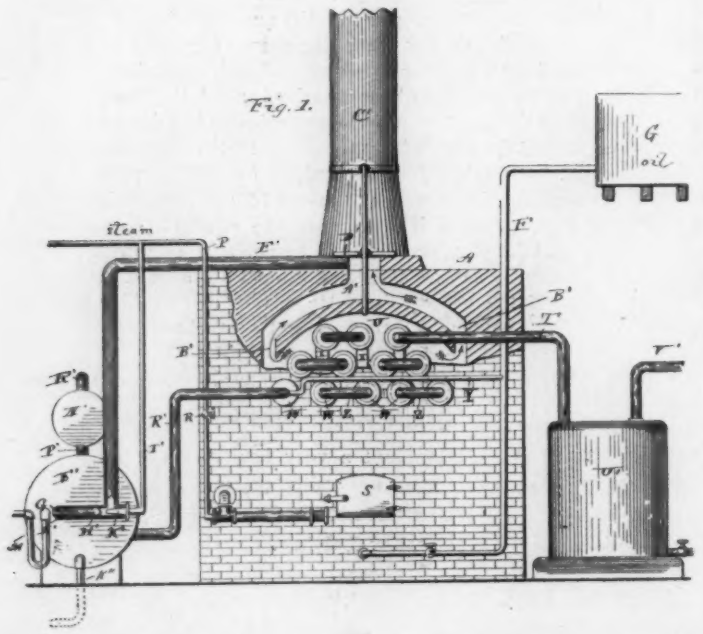
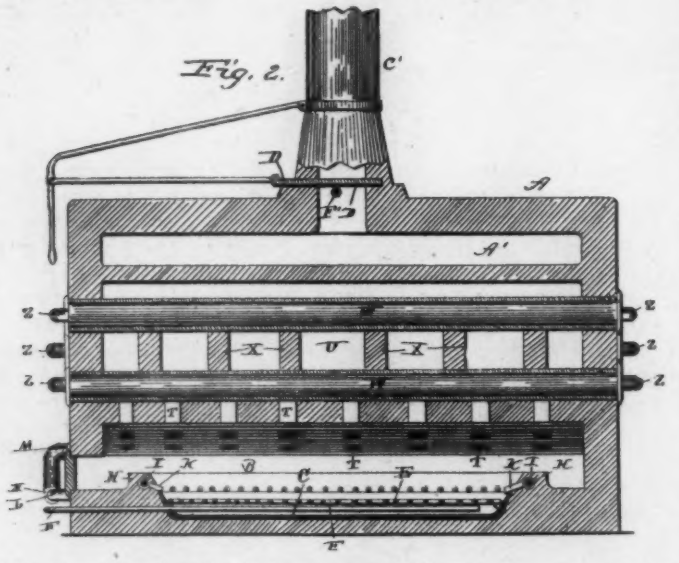


Fig. 2.



The above mentioned objects are accomplished by the means illustrated in the accompanying drawings, forming part of this specification, in which similar letters indicate like parts of the respective figures.

Referring to the drawings, Fig. 1 represents a front elevation of the apparatus which I prefer to employ in practicing my invention. Fig. 2 represents a vertical, longitudinal sectional view of the furnace and retorts forming part of said apparatus. Fig. 3 represents a transverse vertical sectional view of a condenser and its appendages which form part of the apparatus, and Fig. 4 represents a longitudinal sectional view thereof.

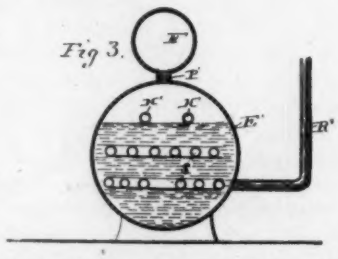
The letter *A* indicates a furnace, which may be constructed of brickwork, masonry, or other suitable material, having a combustion or fire chamber *B* in its lower part. Within said combustion or fire chamber, and set in its bottom or hearth, is a pan or tray *C*, constructed of iron, clay, or other suitable material, or the hearth itself may be simply dished and the tray omitted.

The tray is provided with a perforated diaphragm *E*, and below it is a space *E*, or, in case the hearth is simply dished, a grating or perforated partition may be employed sitting slightly above the bottom of the dished portion, so as to leave a similar space.

F indicates an oil pipe leading from a suitable elevated oil or fluid hydrocarbon receptacle *G* and extending into the space above mentioned, where it terminates or through which it may be extended, and provided with perforations for the escape of oil or hydrocarbon into the space. Around the edge of the depression or dished portion of the hearth is built or located a wall *H*, of firebrick or other sufficiently refractory material, through which extends a tube or flue *I*, having downwardly inclined nozzles *K*, directed toward the interior of the tray or depression. The said tube or flue *I* is extended out through the wall of the furnace at one end and connects with a pipe *L*, which in turn connects with an air pipe *M*, which extends through a passage in the wall of the furnace contiguous to the fire chamber thereof, so that the air passing through said pipe may be heated on its way.

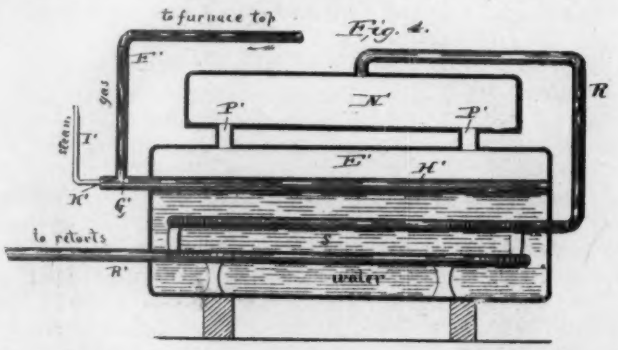
The letter *N* indicates an injector extending into the pipe *I* and connecting with a steam pipe *P*, which communicates with a suitable generator, and which is provided with a suitable cock *R*, by means of which the flow of steam may be regulated.

Fig 3.



The fire chamber is provided with a door *S*, by means of which access may be had to its interior, and its top is arched, as shown, and provided with ports or openings *T*, leading to a retort chamber *U* above. In said chamber is located a bench of any convenient number of retorts *W*, the upper series of which are supported upon bricks *X*, arranged at proper intervals *Y*, as shown in Fig. 2, to permit the free passage of the hot products of combustion around the retorts. The retorts are constructed on the interior of iron and on the exterior of clay or other refractory material to withstand the intense heat to which they are subjected and more uniformly diffuse the heat to the interior of said retorts. The retorts pass through the furnace and are connected alternately at their front and rear ends by means of return bends or elbow pipes *Z*. The retort chamber is arched at its top, and above said arch is formed a chamber or flue *A'*, which communicates with the retort chamber at its sides below the crown of the arch by means of flues *B'* in such manner that

Fig. 4.



the flame and products of combustion passing up from the fire chamber into said retort chamber will be reverberated and passed back over the retorts before passing into the flue *A'*. The flue *A'* connects with a smokestack or exit flue *C'*, and the said exit flue is provided with a valve or damper *D'* for the purpose hereinafter explained.

The letter *E'* indicates a condenser, which consists of a cylindrical vessel of iron or other suitable material, and *F'* indicates a pipe extending from the flue *C'* at a point below the damper to an elbow pipe *G'*, from which extend two horizontal pipes *H'* into the condenser.

The letter *I'* indicates a short pipe having injector nozzles *K'*, which extend into the ends of the pipes *H'* for the purpose of drawing the gas from the furnace and forcing it into the condenser. The pipes *H'* are perforated on their lower sides for the escape of the gas.

The letter *K''* indicates a water inlet pipe connected with a proper head and provided with a suitable valve, the said pipe extending into the lower part of the condenser to supply water thereto.

M' indicates a trap pipe for the escape of water from the condenser, the said trap pipe being so located as to keep the water on a level just above the perforations in the pipes *H'*, so as to compel the gas to pass under the surface of the water as it escapes.

The letter *N'* indicates a drum, which is connected with the upper part of the condenser by means of pipes *P'*. From the said drum extends a pipe *R'*, which passes into the condenser and traverses the same in a series of coils *S* below the surface of the water therein. The said pipe passes out of the condenser at one end and connects with one of the side retorts of the lower series of the bench. From the retort at the upper series of retorts and at the opposite side extends a pipe *T'* to a tank or chamber *U'*, and from this tank extends a pipe *V'* to a gasholder or the point of consumption of the gas. The pipe *I'* connects with the steam pipe *P* before mentioned, by means of which steam is supplied to the injector nozzle *K'*.

The oil supply pipe is provided with a branch pipe *Y'*, leading to the pipe *R'* entering the retorts from the condenser, by means of which oil is supplied with the gas passing from the condenser to the retorts to be fixed.

The operation of the invention will be readily understood in connection with the above description, and is as follows: Oil or fluid hydrocarbon is supplied to the tray in the fire chamber in proper quantities through the oil supply pipe, and rises through the bottom of the tray and a mass or body of absorbent or divided material—such as broken brick—which is placed within the tray. The oil is then ignited and the steam jets turned on, passing through the injector and forcing air through the air pipe and nozzles downward into the fire chamber and the tray. The products of combustion then pass through the flues in the arch of the fire chamber into the retort chamber, striking the arch thereof and being reverberated around the retorts. When the retort chamber and retorts have become sufficiently heated, the damper in the exit flue is closed, or partly closed, and the steam is turned on to the injectors which enter the pipes extending into the condenser, into which the gas from the furnace is forced, being caused to pass under the water. From thence the gas passes into the drum and then through the coil in the condenser, by which aqueous vapor is separated from the gas, and from the coil the gas passes into and through the retorts, where it is converted with the inflowing liquid hydrocarbon into a fixed gas, which passes to the tank and there to the holder or point of consumption. In its passage through the condenser the gas has the steam eliminated or partly eliminated, and the gas in a comparatively dry state passes on to be fixed.

A New Recording Pressure Gauge.

By Prof. W. H. Bristol.

In designing the recording pressure gauge herewith illustrated, the object was to produce an instrument which would be fundamentally

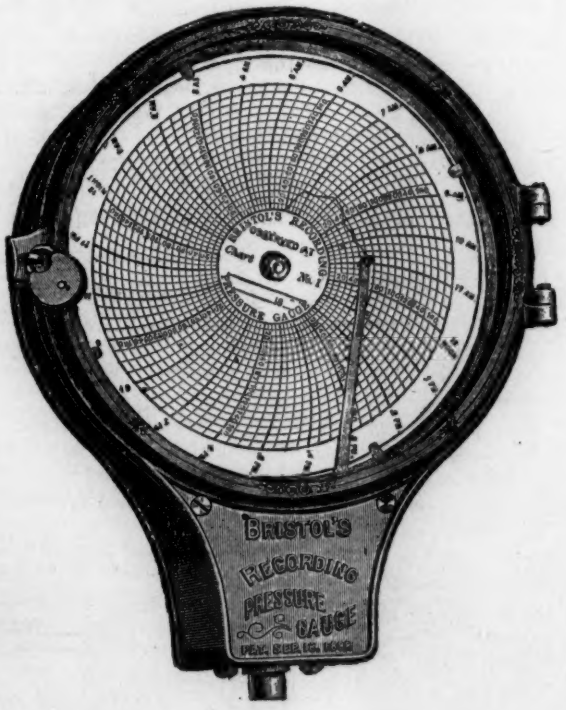


Fig. 1.

simple and consequently reliable, and which could be placed upon the market at a moderate cost.

Fig. 1 illustrates the instrument complete and ready for application. Fig. 2 shows the pressure tube with the inking pointer attached; the front of case, dial, and cover of clock being removed. The pressure

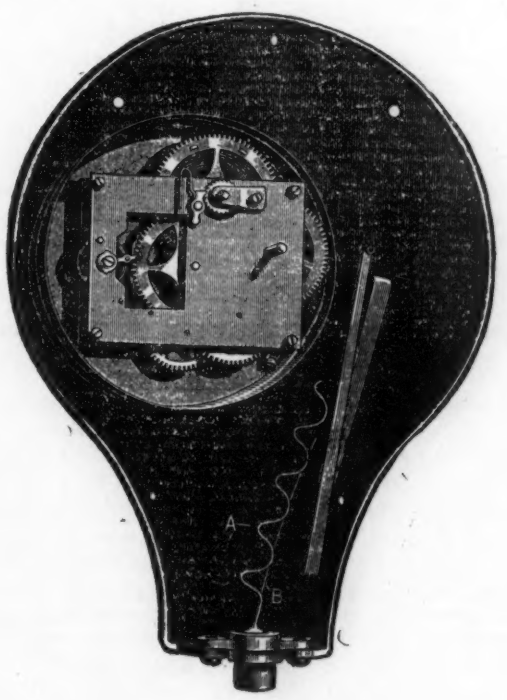


Fig. 2.

tube *A* is of flattened cross-section and bent into approximately a sinusoidal form. A flexible strip *B* of the same metal as the tube is secured at the ends and along the bends, as shown in Fig. 2.

The bent tube may be considered as a series of Bourdon springs placed end to end.

Pressure applied to the tube produces a tendency to straighten each bend, or, collectively, to elongate the whole. This tendency to lengthen the tube is resisted by the flexible strip *B*, and thereby converted into a multiplied lateral motion. The inking pointer is attached directly to the end of the pressure tube, as shown in Fig. 2, from which it will be seen that the usual mechanism and multiplying devices are dispensed with, since the motion of the tube itself is positive and of sufficient range. The special advantage of this is evident, considering that in all other pressure gauges the movement of the tube or diaphragm is small, and requires a system of mechanism to multiply the motion many times before it is available for indicating purposes. These multiplying devices must be delicately constructed and properly cared for, and even under the most favorable conditions they are liable at any moment to be a source of error.

In the instrument illustrated the tube is designed for a range of 180 pounds per square inch; for other ranges its sensitiveness may be varied at will by changing its proportions, as length, shape of cross-section, or thickness. The printed charts for receiving the record make one revolution in 24 hours, and are provided with radial arcs and concentric circles, the divisions on the radial arcs corresponding to differences in pressure, while those on the concentric circles correspond to the hours of the day and night. During the past two years several of the instruments have been in operation upon the steam boilers at Stevens Institute (Hoboken, N. J.), and have given perfectly satisfactory results.

In regard to making the tubes alike, it will be well to state that there has been no difficulty in producing a number in which the deflections were equal for equal pressures, and which have been directly applied to a standard chart without adjustment. It will be readily seen that, in case there should be slight differences in the deflections, such differences may be allowed for by raising or lowering the tube with reference to the dial. This is equivalent to shortening or lengthening the deflections along the radial arcs. For an indicating instrument it is only necessary to provide a graduated arc for the end of the tube to move over.

It is evident that the instrument is adapted for a vacuum as well as for a pressure gauge, and it naturally follows that, if sufficiently sensitive, it will serve as a barometer and measure changes of atmospheric pressure.

The model herewith exhibited for this purpose was made by electrodeposition of nickel upon a piece of solder of the proper form, the solder

being afterward melted out in oil. The walls of this tube are $\frac{1}{50}$ inch thick. When this tube is exhausted of air and sealed, as shown, it gives a deflection of about 3½ inches for an external change of pressure of one atmosphere.

Another application of the pressure tube is in the recording thermometer. The tube may be filled with a very expansible liquid, such as alcohol, and sealed. Variations in temperature produce expansion of the inclosed liquid, which, in turn, gives deflections of the tube to correspond. These deflections may be used to record directly, without multiplying devices, as shown in one of the models.

The tubes of the pressure gauges to be inspected have been made by the writer at Stevens Institute, for the purpose of thoroughly testing the novel form. The results have been perfectly satisfactory, and our recent experience in manufacturing has demonstrated the possibility of duplicating the tubes in quantities for a standard chart.

Boston Insurance Rules in Respect to Fire Risks of Electric Lighting.

The following rules and regulations (prepared by Messrs. C. J. H. Woodbury, F. E. Cabot, C. N. Goddard and S. E. Barton) respecting the installation of electric lighting and motive power apparatus have been adopted by the Boston Manufacturers' Mutual Fire, and the Electric Mutual Insurance Companies and the Boston Fire Underwriters' Union.

Dynamos and Switchboards.—1. Dynamos must be located in dry places, not exposed to flyings or combustible material, and must be insulated upon dry wood, filled to prevent absorption of moisture. They must be kept thoroughly clean and dry. They must be provided with a reliable, automatic regulating device, or a competent person must be in attendance near the machine whenever it is in operation. In wiring for motive power the same precautions should be taken as with a current of the same volume and potential for lighting. Each machine should be provided with a waterproof cover, which should be used whenever the machine is not in operation.

2. Switchboards, or other apparatus near the dynamos, for controlling circuits and currents, should be so located that they will be accessible, and open on all sides, and entirely disconnected from all woodwork or combustible material; also kept free from moisture. They should be incombustible and rendered non-absorbent of water.

Motors.—3. All resistance boxes or devices should be made of non-combustible material, or so located that they cannot communicate fire to any surrounding combustible material. The motor (and resistance box) should be protected by a cut-out, and controlled by a switch.

4. Motor cars driven by electricity from a single wire with earth or floor return circuit will not be approved in any building insured by this Company. The use of such single trolley tracks may be permitted, after special inspection, in mill yards where there is no liability of other conductors coming in contact with the trolley wire, and where the conditions of the position of the generator are such that the ground circuit will not impose any fire hazard on the property.

5. Wires for electric lighting or stationary motors will not be permitted in the same circuit with trolley wires with ground return; the stock insurance companies will permit such installations, subject to special inspection and agreement, on payment of a suitable charge for the permit covering this increased hazard, although the same dynamo can be used, if desired, for both purposes, provided that the connection from the dynamo to each of the two circuits shall be a double throw switch, so that only one of the circuits shall be in service at the same time. In such cases the wires for lighting or stationary motors shall be in the usual manner, entirely on a metallic circuit without ground.

Testing.—6. All circuits should be tested at least twice a day with a suitable magneto, or other approved device, in order to discover any escapes to ground that may exist. One test should be made in the morning and another in ample time before starting to remove any defect, should it be found to exist. The rules for testing should be observed in any separate or isolated plant, the same as in central stations.

Arc System.

Outside Wires.—7. All outside or overhead wires must be covered with some material of high insulating power, not easily abraded; they must be firmly secured to properly insulated and substantially built supports. All tie wires must have an insulation equal to that of the conducting wires.

8. All joints must be so made that a perfectly secure and unvarying connection, fully equal to the cross section of the conducting wire, will be secured, and they should be soldered. All joints must be securely wrapped with an approved tape.

The following formula for soldering fluid is recommended: Saturated solution of zinc, 5 parts; alcohol, 4 parts; glycerine, 1 part.

9. Care must be taken that conducting wires are not placed in such position that it would be easy for water or any liquid to form cross-connection between them, and they should not approach each other nearer than 1 foot. The wires must never be allowed in contact with any substance other than air and their proper insulating supports; except that service wires with special insulation may be permitted to touch foreign substances.

10. Conducting wires carried over or attached to buildings must be at least 7 feet above the highest point of flat roofs, and 1 foot above the ridge of pitched roofs. Lines constructed subsequent to the adoption of these regulations should not be run over and attached to buildings other than those in which the light or power is being or is to be used, but should be on separate poles or structures, where they can be easily reached for inspection.

11. When they are in proximity to other conducting wires, or any substance likely to divert any portion of the current, dead, insulated guard irons must be placed so as to prevent any possibility of contact in case of accident to the wires or their supports. The same precautions must be taken where sharp angles occur in the line wires, and also where any wires (telegraph, telephone or others) could possibly, owing to their position, come in contact with the electric light wires.

12. Overhead wires from the main circuit or pole in the street to the terminal insulators attached to buildings, and at the point where they enter a building, must not be less than 12 inches apart. They must be rigidly and neatly run and supported by glass or porcelain insulators or rubber hooks.

13. Service blocks must be protected by at least two coats of waterproof paint over their entire surface, and when used to support rubber hooks must have at least 1 inch of wood between the inner end of the hook and the back of the block.

14. For entering buildings, wires with an extra heavy waterproof insulation must be used from the terminal insulators through the walls from the outside to the inside of the building. They must loop down, so that water may drip off without entering the building, and the holes through which they enter should, where possible, slant upward.

15. Wires must enter and leave the building through an approved cut out switch, which must be "double contact," and should effectually close the main circuit and cut off the interior when turned "off." It must be so constructed that there shall be no arc between the points when thrown "on" or "off." It should be automatic in its action in either direction, not stopping between points when once started. It should indicate upon inspection whether current be "on" or "off." It must be mounted on a non-conducting base, kept free from moisture, and easy of access to firemen and police.

Inside Wires.—16. Wires must not be concealed, and they must be rigidly kept apart at least 1 foot, unless an approved moisture proof, non-conducting, non-inflammable tubing is used. This tubing must be sufficiently strong to protect the wires from mechanical injury. It may be fastened to the walls by staples, provided the tubing is not broken or injured thereby. Wires in this class of tubing may be run as near as 3 inches to each other.

17. Conductors in buildings must be thoroughly well insulated with non-absorbent waterproof material, as incombustible as possible, which will adhere to the wire and not fray by friction, and will stand a temperature of 150° without softening.

In places liable to dampness wires must be thoroughly and carefully run on glass insulators, rubber hooks or porcelain knobs of suitable size and shape, and the wires must be separated at least 18 inches. They must also be provided with an approved waterproof insulation or incased in an approved tubing.

When wires pass through walls, floors, partitions, timbers, etc., in doors, glass tubing or so called "floor insulators" or other moisture proof, non-inflammable, insulating tubing must be used.

18. All lightning arresters must be grounded outside of building and perfectly connected to a water pipe.

Arc Lamps.—19. The frames and other exposed parts of arc lamps must be carefully insulated from the circuit.

Each lamp must be provided with a proper hand switch, and also with an automatic switch that will shunt the current around the carbons should they fail to feed properly.

Stops of some kind must be provided to prevent the carbons from falling out in case their clamps fail to hold them; and these stops must always be in place.

20. For inside use, the light must be surrounded by a globe resting in a tight stand, so that no particles of melted copper or heated carbon can

escape. When any inflammable material is near or under the lamp the globe must be protected by a wire netting. Unless a very high globe, which closes in as far as possible at the top, is used, it must be provided with some protector or spark arrester, reaching to a safe distance above the light. Broken or cracked globes must be replaced by perfect ones immediately. (By inflammable material is meant dry goods, clothing, millinery and the like in stores; flyings or goods in fabric factories; shavings and sawdust in woodworking shops, or any other substance that can be readily ignited by droppings or flyings from the lamp.)

[To be concluded.]

Taxation of Pipes in Public Streets.*

Engineering Record says that an interesting question of law, and one upon which the courts are in hopeless disagreement, arises when a tax is levied upon iron pipes laid by private parties in the public streets by permission of the local authorities. Common examples of such pipes are gas and water mains laid by private corporations.

The fundamental inquiry is as to the nature of the interest of the corporation in the mains after they have been laid. Four theories have been held by the courts.

I. In Tennessee it is held that the pipes remain the personal property of the company. [Memphis Gas Light Company v. the State, 6 Coldw. 310.]

II. In Iowa it is held that they are affixed to the land on which the main works or sources of supply are situated, and are taxable as real estate of the company in the town where that land lies, though they may run into another town. [Appeal of the Des Moines Water Company, 48 Ia. 324.]

III. In Rhode Island it is held that they are affixed to an easement which the company possesses in the soil of the street, and are therefore real estate of the company where they lie. [Providence Gas Company v. Thurber, 2 R. I. 15.] They are taxed, then, not *as an easement* of such value, but as actual tangible real estate owned by the company as appurtenant to its easement.

IV. In England it is held that they are affixed to the soil, and are therefore real estate; but that they are only occupied, not owned, by the company. [Compare King v. Brighton Gas Light Co., 5 B. & C. 466, with Chelsea Water Works Co. v. Bowley, 17 Q. B. 358. In the former case the company was held to be an *occupier* of land in the parish through which its pipes ran, and therefore to be liable to the poor rate. In the latter case the company was held to have no *interest* (*i.e.*, ownership) in the land through which the pipes ran, and therefore not to be liable to the land tax. In the former case it was distinctly held that the pipes were not personal property, but were affixed to the soil; the contrary having been urged by the company's counsel. The effect of these two cases is, therefore, as stated in the text.] This view is apparently held in New York also. [People v. Assessors of Brooklyn, 39 N. Y. 81. The decision is that the pipes were not affixed to any land of the company, and therefore not taxable to it as real estate *belonging to it*. The court seems to take it for granted that the pipes were real estate.]

To consider the less tenable views first, it seems clear that the theory of the Iowa court cannot be sustained; though it is supported, it is said, by the practice of the assessors in at least one other Western State. It seems to have at least three fatal flaws. First, it is opposed to the facts. The water mains in that case were no more affixed to the water works than to the street hydrants or to the land of consumers; as, for instance, a bridge is equally affixed to each bank of the river. Secondly, it is opposed to every other decided case in which the subject is considered. Thirdly, it is opposed to common sense.

The Rhode Island case is based on a phrase of Lord Campbell in his decision in the Chelsea water works case, so far as it is based on any authority; and this phrase really lends no aid to the Rhode Island decision. It is a novel idea that a chattel can be so affixed to an easement as to become the real property of the owner of the easement. If, for instance, the owner of a right of way should affix stone steps to the land, would they not pass to the owner of the land? Could they be claimed as affixed to the right of way? There are other objections to the Rhode Island theory, but this seems conclusive.

It remains to consider whether the pipes are personal property. It seems to me that they clearly are not, and that the English and New York theory is preferable to that of Tennessee. The pipes are put in the ground to remain there, or to be removed only when they become worn out and it is necessary to replace them with other pipes. Suppose the license of the company to use the streets were revoked, the company would clearly have no right after that to dig up its pipes. This is, to be sure, consistent with continued ownership by the company; but intention settles the question whether or not they become part of the realty, and the fact that the company can remove its pipes only with the concurrence of the authorities is important, as indicating a probable intention that they shall remain in the soil.

In fact, when a worn out pipe is replaced by a new one, the old iron is carried away by the company. But this is consistent with the theory that the pipe is part of the realty. Suppose a tenant chooses to repair a brick walk on the leased premises, putting in new bricks; would he not be entitled to the old ones? Could the landlord bring trover if he destroyed them? Much more should it be so here. The company having a right to do so enters the land and severs certain old iron from the soil; the iron becomes a new article of property, and may well go to the company.

Suppose, instead of laying pipes through the streets, a gas or water company should dig a tunnel, cementing the sides of it to prevent leakage. There can be no doubt that the cement would become part of the realty. Is there any difference when iron is used in place of cement for the same purpose? As iron pipe is it not *functus officio*, having become the wall of a tunnel, to be removed, if at all, not as iron pipe, but as old junk?

This view, which is that of the English courts, seems to me the only one tenable. If it is correct, the remaining question is merely one of interpretation of the statute providing for taxation. It is in the power of the Legislature to tax the company for the pipes. This may be done, as in New York, by a special provision making the pipes real estate of the company *for purposes of taxation* [Laws of 1881, c. 293], or as in Massachusetts, by taxing the value of the company's franchise, which is, of course, in an indirect way taxation of the pipes, since the value of the franchise includes the value of the pipes. [Dudley v. Jamaica Plain Aqueduct Corporation, 100 Mass., 183.] An expedient holding gas pipes to be part of the machinery of manufacture [Com. v. Lowell Gas Light Co., 12 All., 75; Memphis Gas Light Co. v. The State, 6 Coldw. 310] is questionable in point of fact; if in fact they were part of the machinery of the company they might well be taxed to it as such, though the legal ownership were in another.

In the absence, however, of a special provision of the statutes, pipes in the public street should be taxed neither as the real estate nor as the personal property of the company that lays them.

* Joseph H. Beale, Jr., in the *Harvard Law Review*.

Giffard's Gas Gun.

The London *Daily News* says that recently, at the headquarters of the London Scottish Rifles, some interesting experiments were conducted with M. Paul Giffard's appliance for the employment of liquefied gas as an explosive—or, to be more strictly accurate, one should say as a means of propelling projectiles—in place of gunpowder. M. Paul Giffard's scientific reputation as inventor of the pneumatic tube, and of the "Giffard injector," so largely used in connection with steam power, stands so high that any invention to which his name was attached would be worthy of attentive consideration.

The weapon now introduced by him, however, is something more than an ingenious appliance; it is a discovery which not only promises to revolutionize the gunmakers' art, but it is applicable also to many other purposes as a motive power. Those who are interested in the Giffard gun claim that it is the military weapon of the future. The idea of using liquefied carbonic acid gas as a propulsive power is not new, but M. Giffard is the first who has turned it to practical account.

The gas gun is a model of simplicity, so far as one can judge without examination of the discharging mechanism, in which much of the merit of M. Giffard's invention lies. A small cylinder, called a cartouche, is attached to the barrel of a rifle or a smooth-bore gun. This cylinder contains liquefied gas enough to discharge 220 shots, equal to about 50 bullets of an ordinary service rifle, with a velocity to kill at 600 yards. There is no other explosive. The pellet is simply dropped into an aperture of the barrel, which is hermetically sealed by pressing a lever, and the loading is complete. When the trigger is pressed a small quantity of liquefied gas becomes released and expands in the breech chamber. There is no louder report than the drawing of a champagne cork makes, no smoke, and no fouling of the barrel. In all these respects M. Giffard's gas gun seems to fulfill the requirements of an ideal weapon for warfare; but whether in other respects liquefied gas has advantage over ordinary explosives for military purposes remains to be proved. The inventor says there would be no difficulty in refilling the cylinders with gas on the battlefield; but it is obvious, even if that be the case, that reserve cylinders would have to be supplied to each man, in order to make up the number of rounds now thought to be necessary; and, as bullets would of necessity be carried in addition, the ammunition for a gas gun would weigh just as much as ordinary cartridges, weight for weight.

Mitchell's Improvement in Charging and Discharging Retorts.

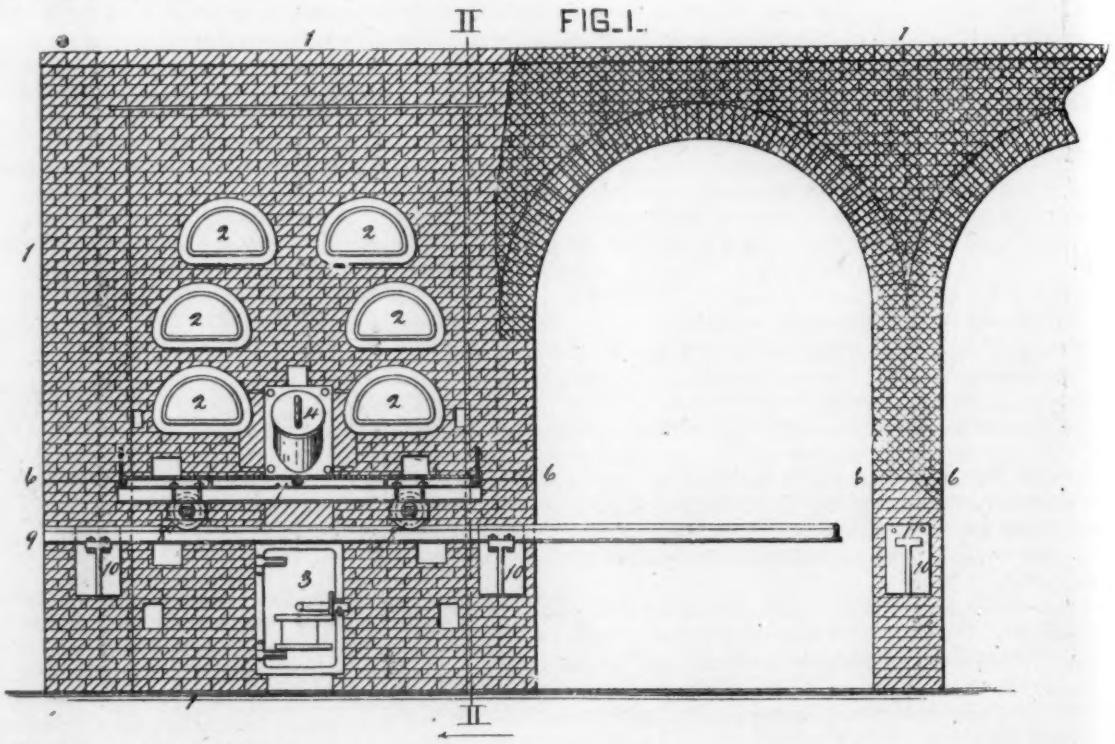
On August 5th U. S. Letters Patent (No. 433,802) were granted to Mr. Kerr M. Mitchell, of St. Joseph, Mo.—an assignment of a one-half interest in the apparatus was subsequently made to Mr. John M. Dell, of St. Louis—for an "improvement" (to use the words of the specification) "in devices used in the charging and discharging of the retorts in gas benches having a pit extending in front of the bench, a platform supported on wheels, and which spans the pit in front of any bench where the retorts are to be charged or discharged."

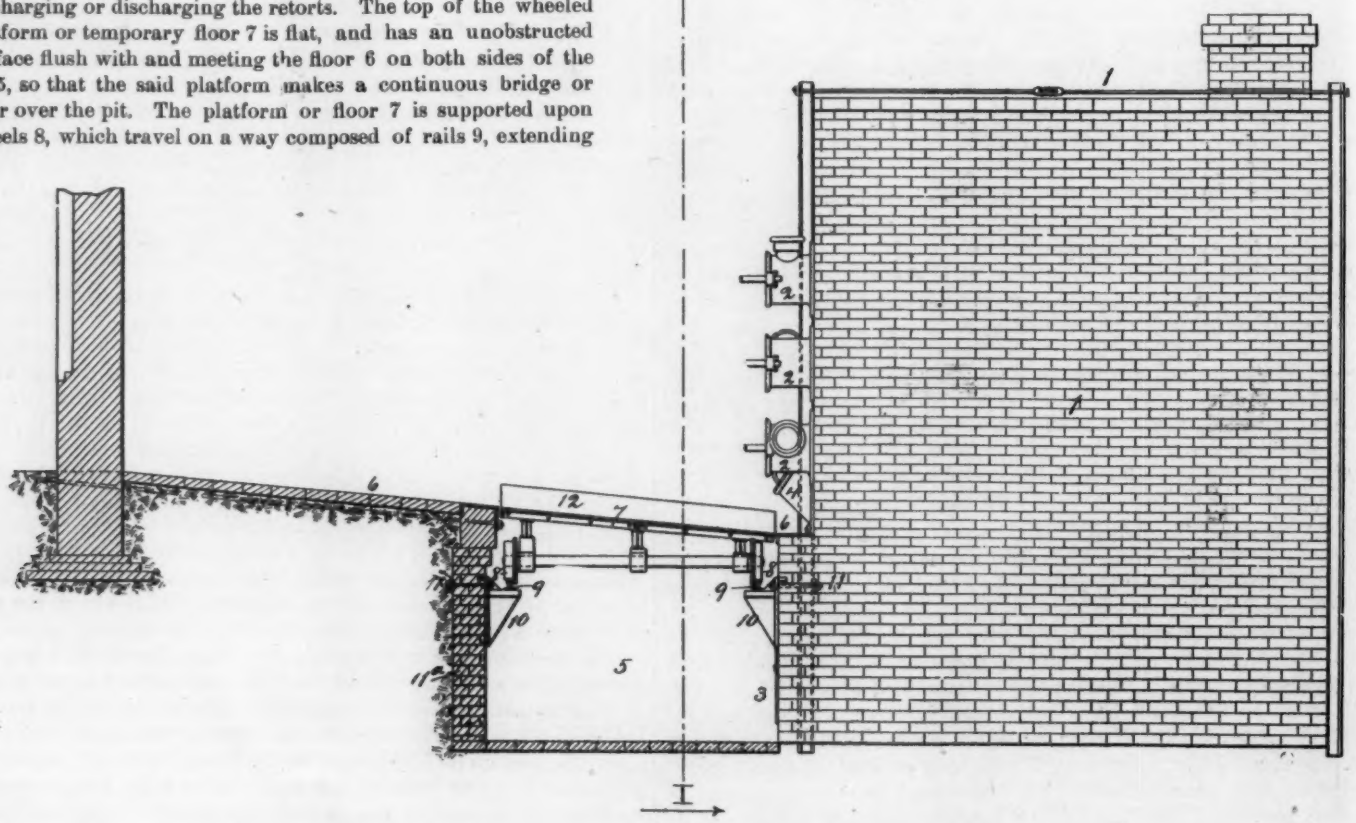
Fig. I. is a vertical section at *I I*, Fig. II. Fig. II. is a vertical section at *II II*, Fig. I.

1 is a retort bench, which may be of any preferred construction. The retorts are seen at 2.

3 is the door to the furnace and ashpit. The elevated feeding mouth of the furnace is seen at 4.

5 is a pit extending along the front of the bench and giving access to the doors 3 of all the benches. The front wall of the furnace may, of course, constitute the inner, while the wall or bank 11ª forms the outer, wall of the pit. At each side of the pit 5 is a fixed or permanent floor 6. 7 is a wheeled platform or temporary floor, which may be wheeled in front of either of the benches for use in charging or discharging the retorts. The top of the wheeled platform or temporary floor 7 is flat, and has an unobstructed surface flush with and meeting the floor 6 on both sides of the pit 5, so that the said platform makes a continuous bridge or floor over the pit. The platform or floor 7 is supported upon wheels 8, which travel on a way composed of rails 9, extending





along each side of the pit 5. These rails may be supported in any suitable manner. The means of support which is shown consists of a number of brackets or chairs 10, secured to the walls of the pit by bolts 11, the rails being bolted to the brackets, as shown. The platform or truck 7 should have sideboards 12.

It will be seen that the wheeled platform or temporary floor will be scarcely any obstruction to the circulation of air in the pit 5, even when it is in use, and when not in use it may be run beyond the end of the pit so as to be out of the way. Thus all conveniences of an unbroken floor 6 are insured in connection with benches having the deep furnaces extending below the level of the floor, and access to which is had by an open pit 5.

I claim as my invention:

1. The combination, with the permanent floor, the retort bench, the furnace for heating said retort bench arranged below the level of the floor, and the wall or bank 11ª, forming with the wall of the furnace the open pit 5, of a way arranged in said pit, and a shiftable platform or temporary floor supported upon said way before the bench, and having its surface flush with the permanent floor.

2. The combination, with the permanent floor, the retort bench, the furnace for heating said retort bench arranged below the level of the floor, and the wall or bank 11ª, forming with the wall of the furnace the open pit 5, of a way arranged in said pit below the level of the floor, a shiftable platform supported upon said way before the bench and having its surface flush with the permanent floor, and the sideboards 12 on said platform.

3. The combination, with the permanent floor, the retort bench, the furnace below the level of said floor for heating said bench, and the wall or bank 11ª, forming with the wall of the furnace the open pit 5, of the rails, supported at the side of the pit below the level of the floor, a flat-topped platform mounted before the bench on wheels on said rails, and having its surface unobstructed and extending from and forming a continuation of the permanent floor.

Alternating Current Motors for Mining Work.

The Western *Electrician* says that the Willock mine, belonging to the Monongahela Gas Coal Company, and situated in the first pool of the Monongahela coal region, is now operated with a complete alternating current motor plant. The machines furnish power in the production of coal, the working of the pump, and also in the operation of an enormous ventilator which keeps a constant draught of pure air in the mine. In addition the mine is illuminated by the alternating current system.

The system followed is that of the Tesla alternating current motor of the Westinghouse Company used in the mine. This is the first mine in the Pennsylvania coal region where the alternating current system is utilized extensively. A correspondent of the *Electrician* who recently visited the mine was much indebted to John Werner, the mine foreman, a man who is himself a mechanical genius of no mean standing. During a conversation with him, he said: "I believe that electric mining has no greater prospects anywhere than just in the coal fields of Pennsylvania. The reasons for this are so many that I hardly know where to commence to enumerate them. Coal mining in Pennsylvania was never such a poor trade as it is now, in fact it is so bad that a native born American will have nothing more to do with the work. The result has been that the business has fallen into the hands of foreigners of the very lowest class, such as Hungarians, Poles and Italians. Then again the price of coal has gone down to such an extent, the result of course of competition, that it is impossible to get any intelligent men who will do the work for the small wages a miner is able to make. This condition of affairs caused the coal operators to hail the application of electricity to a coal mine with great satisfaction, and I believe that it will not be long before every mine in the country will be operated by electricity. The advantages afforded by electricity in the operation of a mine are so manifold that its use is bound to become general. For instance, where a coal digger was able to earn on the average $2.25 per day, the machine miner makes $3. Why? Because while the operator pays the miner less for the production of each ton of coal, the man can produce so much more with the aid of his machine that he can make better wages now and the work is less laborious. The operator pays the coal digger 79 cents per ton of coal, but the production of each ton with the aid of electricity costs him only 49 cents; so you see there is a pure gain for the operator of 30 cents for each ton."

The electric plant consists of a 30 horse power quarter-phase generator of a capacity sufficient to carry seven motors when cutting coal, at the limit of the capacity of the coal company. The generator is self-acting, self-regulating, and so wound that as the load increases the e. m. f. rises. By the aid of a hand rheostat the adjustments can be so made that the falling off in the speed of the engine and the drop in the line may be compensated for and a very close approximation to constant e. m. f. at the motors is obtained. After the hand rheostat is once adjusted it is unnecessary to make further adjustments, for the self-regulating devices are automatic. Three wires from the collector at the end generator shaft pass from the switch-board and main line switches directly into the mine. On the switch-board is a direct reading voltmeter and an ammeter. The e. m. f. at the motor is 300 volts in this installation.

Where the distance becomes very great a higher e. m. f. may, of course, be used. The mine is wired with high-class rubber-covered wire, and the insulation of each wire is practically continuous from the time the wire leaves the main switch in the power house until it reaches the end of the circuit. At the entrance of each room and also at convenient points through the mine, switches are located and safety catches inserted. This insures safety from short circuiting and also allows any portion of the circuit to be cut off from the generator without interfering with the work in other parts of the mine. From the switch in the room to the coal-cutting machine the current is carried by a three-wire cable. This cable is highly insulated and covered with a protecting braid, so that though it is frequently allowed to lie on the damp floor and even in pools of water, yet no inconvenience is noticed arising from this. It is necessary only to have a jaw switch at the motor with which the circuit can be opened and closed. No regulator of any kind is used. The only auxiliary apparatus connected with the motor, with which the operator of the machine has anything to do is the switch to turn the current on and off. The motor is completely covered and there is no possible chance of getting a shock through careless handling, it is claimed.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Sutherland process has recently been installed in the works of the Port Henry (N. Y.) Gas Company, where it is said to be giving good results. The plant is rated to daily production of 30,000 cubic feet.

A SIMILAR installation has also been made by the proprietors of the Waterville (N. Y.) Company.

PARAGRAPH 65 of the revised laws of the State of New York, in respect to the manufacture and distribution of gas or the supply of electric currents bears the title, "Gas and Electric Light must be Supplied on Application," and its directions are as follows: "Upon the application, in writing, of the owner or occupant of any building or premises within 100 feet of any main laid down by any gas light corporation, or the wires of any electric corporation, and payment by him of all money due from him to the corporation, the corporation shall supply gas or electric light as may be required for lighting such building or premises, notwithstanding there be rent or compensation in arrear, for gas or electric light supplied, or for meter, wire, pipe or fittings, furnished to a former occupant thereof, unless such owner or occupant shall have undertaken or agreed with the former occupant to pay or to exonorate him from the payment of such arrears, and shall neglect or refuse to pay the same; and if for the space of 10 days after such application, and the deposit of a reasonable sum, as provided in the next section, if required, the corporation shall refuse or neglect to supply gas or electric light as required, such corporation shall forfeit and pay to the applicant the sum of $10 and the further sum of $5 for every day thereafter during which such refusal or neglect shall continue; provided that no such corporation shall be required to lay service pipes or wires for the purpose of supplying gas or electric light to any applicant where the ground in which such pipe or wire is required to be laid shall be frozen; or shall otherwise present serious obstacles to laying the same; nor unless the applicant, if required, shall deposit in advance with the corporation a sum of money sufficient to pay the cost of his portion of the pipe or wire required to be laid, and the expense of laying such portion."

PARAGRAPH 66 is entitled, "Deposit of Money may be Required," and is as follows: "Every gas light and electric light corporation may require every person to which such corporation shall supply gas or electric light for lighting any building, room or premises to deposit with such corporation a reasonable sum of money according to the number and size of lights used or required, or proposed to be used for two calendar months, by such person, and the quantity of gas and electric light rent or compensation for gas consumed, or rent of pipe or wire and fixtures, to become due to the corporation, but every corporation shall allow and pay to every depositor legal interest on the sum deposited for the time his deposit shall remain with the corporation."

PARAGRAPH 68 is entitled, "Refusal or Neglect to Pay Rent," and is as follows: "If any person supplied with gas or electric light by any such corporation shall neglect or refuse to pay the rent or remuneration due for the same or for the wires, pipes or fittings let by the corporation for supplying or using such gas or electric light, or for ascertaining the quantity consumed or used as required by his contract with the corporation, or shall refuse or neglect, after being required so to do, to make the deposit required, such corporation may prevent the gas or electric light from entering the premises of such person; and their officers, agents or workmen may enter into or upon any such premises between the hours of 8 o'clock in the forenoon and 6 o'clock in the afternoon, and separate and carry away any meter, pipe, fittings, wires or other property of the corporation, and may disconnect any meter, pipe, fittings or other works, whether the property of the corporation or not, from the mains, pipes or wires of the corporation."

PARAGRAPH 64, which relates to the "Inspection of Gas Meters," reads: "No corporation or person shall furnish or put in use any gas

meter which shall not have been inspected, proved or sealed by the Inspector, except during such time as the office of Inspector may be vacant, or such Inspector, after request made, shall refuse or neglect to prove and seal the meters furnished for that purpose, and every gas light corporation shall provide and keep in and upon its premises a proper and suitable apparatus, to be approved and sealed by the Inspector of meters, for testing and proving the accuracy of the gas meters furnished for use by it, and by which apparatus every meter may and shall be tested, on the written request of the consumer, to whom the same shall be furnished, and in his presence, if he desire it. If any such meter, on being so tested, shall be found defective or incorrect to the prejudice or injury of the consumer, the necessary removal, inspection, correction and replacing of such meter shall be without expense to the consumer, but in all other cases he shall pay the reasonable expenses of such removal, inspection and replacing; and in case any consumer shall not be satisfied with such inspection of the meter furnished to him, and shall give to the corporation written notice to that effect, he may have such meter re-inspected by the State Inspector, if he require it, upon the same terms and conditions as herein provided for the original inspection thereof."

MR. A. W. STARK has been chosen Vice-President of the City Gas Light Company, of Norfolk, Va.

THE proprietors of the City Gas Company (Norfolk, Va.) have arranged to add an incandescent electric lighting plant, of the Thomson-Houston type, to the arc plant (same system) that they have been operating for the past two years.

CAPTAIN H. B. ADAM agrees with Brother Hookey, of the Augusta (Ga.) Gas Light Company, that gas cooking stoves are a great means of increasing day consumption. In any event their efforts in the matter of introducing these useful kitchen standards this summer have met with decidedly good returns. The Company sells the stoves at cost, and even goes so far as to furnish, without charge, separate piping connections, where the length of the latter does not exceed 40 feet. A handsome and varied line of cookers, heaters, etc., can always be found on show at the Company's office.

THE Standard Gas Light Company, of this city, will put up a one-story brick building (to cost $15,000) on the north side of 115th street, about 300 feet east of Pleasant avenue.

THE Philadelphia papers of recent date afford the information that a bill in equity was, on the 8th inst., filed in the local Common Pleas Court No. 1, by Arthur Kitson, against the Kitson Gas Light Improvement Company, of which he is Vice-President and a stockholder; the Siemens-Lungren Company; the Goodwin Gas Stove and Meter Company; and Messrs. Wm. W. Goodwin, David H. Fox, Silas W. Petit, Emanuel Stein, William K. Park, Nicholas H. Muhlenberg, E. Z. Schmucker, Henry Baumgardner and John Baumgardner. In his complaint he avers that upon the formation of the Kitson Company it was agreed that the inventor should receive 15,000 shares as compensation for the transfer of letters patent and the applications, but he swears he received only 7,509 shares. His claim is that the withheld shares have been transferred to President Baumgardner, so that he should be deprived of their use and vote. Kitson has sold 2,725 shares, and now wants the balance. Kitson further avers that the Company entered into a contract with the Siemens-Lungren Company to manufacture, advertise and sell the lamps, but by a secret understanding this was not being done, and the business of the Kitson Company has been thereby injured. Many other allegations are made, and Kitson asks that the Company be compelled to transfer to him 4,775 shares of stock; that John Baumgardner return to him any certificates which belong to him; that the other defendants explain their transactions with each other; that a meeting of the Company be called; that the President and Secretary, Henry W. Baumgardner and Wm. W. Goodwin, be ordered to register the Corporation in the office of the Secretary of the Commonwealth; that an account be given and Kitson paid any surplus dividends to which he has a right; that Kitson be allowed to see the books and papers of the Company; that an injunction be granted restraining Goodwin, Fox and Park from interfering with the action of the Board of Directors on the ground of being the Executive Committee, and that a full and clear explanation of the "tangled affairs" of the Company be submitted to the plaintiff.

WHILE not in any sense cognizant of the "true inwardness" of this action, we nevertheless are certain that the complainant will have much to think over if the merits of the case are fully sifted. In fact, we are "with the defendants."

THE Palmyra (Marion County, Mo.) Light and Water Company has been incorporated by Messrs. B. F. Hobart, E. B. Loveland and W. P. Heath. It is capitalized in $50,000. Gas and electric light plants and a water works are projected. This place is in Liberty township, at a point 5 or 6 miles west of the Mississippi River. It is midway of Hannibal, Mo., and Quincy, Ills., and about 15 miles distant from either place. It has good railway connections, is a bustling, busy spot, and holds a population of about 5,500.

WATERTOWN (Wis.) pays at the rate of $7 per month each, for 52 half-arcs on its streets.

THE following, from the New Bedford (Mass.) *Mercury* pretty fully explains the lighting situation in that city: "A meeting of the Directors of the New Bedford Gas Light Company was recently held for the purpose of considering the revision of electric light rates. Within a few weeks an effort was made by the officers of the Company to make the contract rate more equable than it had been hitherto; and in doing this a very considerable advance was made in some instances. Thereupon came protests on every hand, which led to a partial reconsideration of the first propositions that were made. A few consumers have accepted contracts at the advanced rates, and such will be recognized. The propositions will be withdrawn, however, as far as those consumers who have not accepted the advanced rates are concerned, and no more contracts will be made, excepting, perhaps, in peculiar cases, as for insolated lights, or where it would not be profitable to put in a meter. All lights hereafter will be charged for at meter rates, which have been reduced from 1¼ cents to 1 cent per lamp per hour, and the latter rate is subject to the following discounts for payment within 10 days from presentation of the bill: On bills of less than $8 per month, 5 per cent. discount; on bills of $8 and less than $16, 10 per cent. discount, and on bills of $16 and over, 15 per cent. discount. Customers, whose contracts have already expired will be continued at the old rates, if notice is given at the office of the Company, until meters are supplied, while others will be connected as their contracts expire. An official of the Company, when visited at the office on Union street, said to a *Mercury* reporter: 'We found grossly varying and unjust rates for similar service. For instance, James M. Lawton, Jr., has had about 62 lamps for the sum of $12.50 per month, an average of 20 cents per lamp per month, and it is well known that he is a large day user. Briggs & Lawrence have had the use of 92, and lately of 108 lamps, besides a 1½ horse power motor and night lamp, for the sum of $14.50; or an average of 13.4 cents per lamp per month. Under these circumstances it is not surprising that both firms felt aggrieved at being compelled to choose between meters, which would oblige them to pay for what they burned, as others are doing, or paying a confessedly large contract price. Both firms were offered meters and declined them. These rates are actually below the cost of production, and this necessitated an increase which was unwarranted only in appearance.' How will the revised meter rates compare with the cost of gas? was asked. The reply was: 'On bills of less than $8 the price is the equivalent of gas at $1.90 per 1,000; on bills of from $8 to $16, it is equal to gas at $1.80 per 1,000; while on bills of $16 or over it is equivalent to gas at $1.70 per 1,000.' The gas rates will not be changed from $2, or $1.80 net for prompt payment, and $1.50 net on amounts of 4,000 cubic feet per month. Hereafter both gas and electric light bills will be rendered monthly, instead of quarterly, as has been the custom with the gas bills, and 10 days instead of 5 will be allowed as the period in which to avail of the discount for prompt payment."

THE Street Commissioners of Saratoga Springs, N. Y., have entered into a contract with the Consumers Gas and Electric Light Company for the public lighting. The rate agreed upon is $21.50 per lamp, and the contract is to run for 1 year.

ALEXANDER HAYS, who had been in the employ of the Louisville (Ky.) Electric Light Company for the past 3 years, was recently arrested by detectives Fow and Fritsch, and charged by his captors with stealing waste copper. For several weeks the lines on Preston and Main streets had been cut in several places and the wire carried off. The detectives who worked up the case traced the wire to the house occupied by defendant.

THE City Council of Topeka, Kas., have passed an ordinance creating an electric lighting department. It provides for a superintendent, an assistant superintendent, one engineer, three trimmers and one lineman,

each of the subordinates to be under the control of the superintendent and to be selected by him, subject to the approval of the Mayor and Council. He is to report every month to the Mayor and Council the condition of the electric light plant.

THE capital stock of the Clinton (Mass.) Gas Light Company has been increased to $60,000, from $35,000, and the new issue was immediately disposed of at par—$500 per share. The money thus raised is to be expended in the construction and equipment of the Company's new electric light station now underway. When the structure is completed the Company will own one of the best appointed and most perfectly equipped electric lighting stations in New England. Arc and incandescent lights and currents for power purposes will be supplied. There can be no doubt about the fact that Treasurer Bigelow and his associates intend to hold the lighting field at Clinton; and they know how to hold their own against all comers.

ATTORNEY S. E. EWING (of the firm of Ewing & Sturgis, who control the Uniontown, Pa., Light and Heat Company) recently appeared before the Town Council and urged that an ordinance be passed granting to his Company the right of way for the placing of electric light poles and wires. It is likely the Council will take favorable action. This Company is enjoying a fair business in gas supply, and important betterments are being made on the plant. When the latter are completed the manufacturing capacity of the works will equal 100,000 cubic feet per day.

THE San Francisco Gas Light Company will build a wharf (for the reception of coal cargoes) at the foot of Second street. M. E. Manson, C. E., has the matter in charge.

THE Hon. Mr. Kean, President of the Elizabethtown (N. J.) Gas Company, has, through the Company's attorney, Frank Berger, served notice on the Metropolitan (opposition) Company that whenever the mains of the latter Company have been laid so as to interfere with the mains of the former Company, such offending mains will be either cut out or removed.

AT the annual meeting of the Gloucester City (N. J.) Electric Light Company the following officers were chosen: President, Philip H. Fowler; Secretary and Treasurer, Chas. H. Fowler; Superintendent, Frank A. Fowler; Directors, Wm. J. Thompson, G. A. Muller and F. A. Fowler.

A RECENT issue of the Worcester (Mass.) *Spy* prints the following, which is full of suggestion in respect to the plan of charging the city one price for its lights, while ordinary consumers have to pay another: "There are many business men on Main and Front, and on other streets of the city as well, who use arc electric lights for the illumination of their stores, for which service they are charged 50 cents a night, the lights being put out before 11 o'clock, P.M. They believe that this price is exorbitant, seeing that the Electric Light Company has agreed to furnish the city government with street lights, from dusk to daylight, which means 3 or 4 o'clock in the morning, at 40 cents per light. The business men, therefore, claim a reduction. Thirty five cents per night they think would be a very fair price for the short time the lights are used. A petition to the Company for such reduction has been prepared, and signatures will be solicited."

THE Trustees of Watkins, N. Y., have made a temporary contract with the Watkins Gas Company for the public lighting.

THE Enterprise Light, Power and Heat Company, of McKeesport, Pa., has been organized, with a capital of $100,000, to do business at Reynoldstown. The officers are: President, J. E. White; Treasurer, Thos. Reynolds; Secretary, L. G. Reiber; Solicitor, H. H. Swaney.

THE building lately completed by the old Las Vegas (N. M.) Gas and Coke Company, for the housing of its electric plant, is a substantial structure of wood and iron. The motive power comprises a 100-horse power boiler feeding a compound Westinghouse engine. Directly opposite the engine is the arc dynamo, having a capacity of 50 arcs of 2,000-candle power each, and next in sequence is the incandescent dynamo, which can be depended upon to maintain 600 lamps of 16-candle power. In fine, the Company has a perfect plant, equipped with all that is modern and reliable in electric lighting supply. Mr. M. S. Hart, the Superintendent, has been busily engaged for the past 4 months in overlooking and directing the details of the work, and it is to his unflagging industry that the Company was, on the 9th inst., enabled to take up the public lighting contract awarded it last spring for the illumination of the streets of Las Vegas. Mr. Hart has our congratulations.

ASSOCIATE JUSTICE L. B. WATKINS, of the Supreme Court of Louisiana, on August 6th rendered an opinion in the case of the State ex rel. vs. The Jefferson City Gas Light Company vs. The Mayor and Council of the City of New Orleans, of which the following is a syllabus: This case presents questions of facts only. The relator seeks by mandamus to compel the City Council to raise its budget appropriation from $30,000 to $55,000, to cover additional compensation claimed by it of $12,350 for a deficit in 1888, and $12,650 on a shortage in 1889 for gas lighting on the streets of the sixth and seventh municipalities of the city of New Orleans. Held, that relator must make satisfactory proof of the gas lamps having been erected on the streets unnamed in the municipal contract of 1868, by municipal authority, otherwise mandamus will be refused. Mr. Justice Breaux takes no part, not having heard the argument. The above judgment is not final, it is said, as a rehearing will be asked for in November. In the meantime it has been suggested that an amicable settlement be made between the city and Company to avoid a further suit to prove the authority for and the evidence showing the lighting of 247 lamps in the unnamed streets referred to in the decision.

THE following, from the Lawrence (Mass.) *Daily Eagle*, is self-explanatory: An interesting controversy has arisen between the Lawrence Gas Company and the Methuen Gas Light Company in the matter of lighting the town of Methuen by gas and electricity. The Methuen Gas Light Company was organized something over a year ago by a number of citizens of the town. The Company was granted a charter by the Legislature and soon after petitioned the Selectmen for a franchise to light the town by gas and electricity. A hearing was given in the matter and the Company was given permission to go ahead, the limit of time for so doing being fixed at one year. Since that time nearly all of those citizens interested in the formation of the Company have drawn out and their places have been filled by out-of-town persons. The time stated in their franchise expired last month, and the Lawrence Gas Company then petitioned for the privilege of lighting the town by gas and electricity. They were given a hearing, and the Methuen Gas Light Company were present and remonstrated. The Selectmen, however, at a subsequent meeting, granted the Lawrence Gas Company the right to furnish gas in the town, and the Lawrence Gas Company at once commenced to lay pipes in the town along Broadway. Immediately after the action of the Selectmen had become known it was stated that the Methuen Company would at once endeavor to procure an injunction restraining the Lawrence Company from carrying out its plans. Agent C. J. R. Humphreys, of the Lawrence Gas Company, was seen by an *Eagle* reporter and asked concerning the matter of an injunction being served on the action of his Company by the Methuen Company. Mr. Humphreys said that he had not heard of any such action on the part of that Company, and moreover he did not think it likely there would be any. The Lawrence Gas Company petitioned the Selectmen for the right to furnish both gas and electricity, but was granted only the privilege to light by the former. This action on the part of the Selectmen is said to have been due to the fact that the Methuen Company had previously petitioned the Selectmen for a new franchise wherein they had asked to light the town by electricity only. The Selectmen for this reason decided to wait until such time as the Methuen Company had been given a hearing before the Lawrence Company should be granted the extra right to provide electricity. If action favorable to the Methuen Company in allowing them to furnish electricity is taken by the Selectmen, Agent Humphreys says that under no consideration will his Company furnish a supply of gas to the town, independent of electricity. Mr. Humphreys stated that the Lawrence Gas Company had asked the Selectmen for the privilege of lighting the town by gas and electricity, and the Company would not furnish one without the other.

THE Lowell (Mass.) Company is running a 12-inch wrought iron pipe across the Merrimack street bridge. It replaces the cast iron pipe that formerly did service there.

THE annual meeting of the stockholders in the St. Clair Light and Fuel Company will be held, on Wednesday of this week, at the Russell House, Detroit, Mich.

THE Union Illuminating and Fuel Gas Company, with a capital stock of $500,000, has been organized at Portland, Me. Its officers are: President, Geo. B. Neal, of Boston, Mass., Treasurer, Fred. J. Hutchinson, Boston, Mass.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

August 18.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	98	98¼
Central	500,000	50	85	95
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	127	130
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	—
Mutual	3,500,000	100	123	125
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	—	45
Preferred	5,000,000	100	84	87
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20;000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	118	122
Citizens	1,200,000	20	90	—
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	144	146
" Bonds	300,000		100	105
Peoples	1,000,000	10	95	100
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	109	111
Nassau	1,000,000	25	130	—
" Ctfs	700,000	1000	100	102
Williamsburgh	1,000,000	50	131	—
" Bonds	1,000,000	—	108	112
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	93	93½
2d " " "	3,000,000	1000	71	72
Bay State Gas Co.—				
Stock	5,000,000	50	85	86
Income Bonds	2,000,000	1000	95½	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds	45,000	—	—	—
Chicago Gas Company	25,000,000	100	55¼	—
Chicago Gas Light & Coke Co.—				
G't'd Gold Bonds	7,650,000	100	—	92½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	98
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	94	98½
Consumers Gas Light Co., Jersey City	2,000,000	100	20	—
Bonds	600,000	1000	80	—
Cincinnati G. & C. Co.	6,000,000	100	201	203
Consumers Toronto	1,000,000	50	190	200
Central, S. F., Cal			80	90
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	50¾	51½
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	75	90
Bonds	250,000		—	—
Hartford, Conn	750,000	25	102	108
Jersey City	750,000	20	170	175
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	19¾	20
Preferred "	2,500,000	100	52½	71
Bonds	9,034,400	1000	80	80½

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 241
Wm. Henry White, New York City ... 247
Wm. Mooney, New York City ... 241
William Gardner, Pittsburgh, Pa ... 241
Fred. Bredel, N. Y. City ... 243

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa ... 241
Mellert Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) ... 241
Ohio Pipe Co., Columbus, Ohio ... 241
M. J. Drummond, New York City ... 241
R. D. Wood & Co., Phila., Pa ... 246
Warren Foundry & Machine Co., New York City ... 241
Donaldson Iron Co., Emaus, Pa ... 241
Dennis Long & Company, Louisville, Ky ... 241
Spiral Weld Tube Company, New York City ... 241

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 247
Continental Iron Works, Greenpoint, L. I ... 247
Delly & Fowler, Phila., Pa ... 247
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 244
Stacey Mfg. Co., Cincinnati, Ohio ... 247
Bartlett, Hayward & Co., Baltimore, Md ... 245
Morris, Tasker & Co., Limited, Phila., Pa ... 245
Davis & Farnum Mfg Co., Waltham, Mass ... 244
R. D. Wood & Co., Phila., Pa ... 246
Bouton Foundry Co., Chicago, Ills ... 247
Smith & Sayre Manufacturing Co., New York City ... 246
Fred. Bredel, N. Y. City ... 243
United Gas Improvement Co., Phila., Pa ... 237
National Gas Light and Fuel Co., Chicago, Ills ... 234
Simpkin & Hillyer, Richmond, Va ... 233
Berlin Iron Bridge Company, East Berlin, Conn ... 158

PROCESSES.

National Gas Light and Fuel Co., Chicago, Ills ... 234
Bartlett, Hayward & Co., Baltimore, Md ... 245
Wm. Henry White, N. Y. City ... 247
United Gas Improvement Co., Phila., Pa ... 237

INCLINED RETORTS.

Laclede Fire Brick Manuf'g Co., St. Louis, Mo ... 195

GASHOLDER TANKS.

W. C. Whyte, New York City ... 234
J. P. Whittier, Brooklyn, N. Y ... 239

GASHOLDER PAINT.

The Government Waterproof Paint Co., Boston, Mass ... 233

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J ... 242
B Kreischer & Sons, New York City ... 242
Adam Weber, New York City ... 242
Laclede Fire Brick Manuf'g Co., St. Louis, Mo ... 242
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 242
Borgner & O'Brien, Phila., Pa ... 242
James Gardner, Jr., Pittsburgh, Pa ... 242
Henry Maurer & Son, New York City ... 243
Chicago Retort and Fire Brick Co., Chicago, Ills ... 242
Baltimore Retort and Fire Brick Co., Baltimore ... 242
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 242
Boston Fire Brick Works, Boston, Mass ... 242

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City ... 200
R. D. Wood & Co., Phila., Pa ... 246
James R. Floyd & Sons, New York City ... 240

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 245
Fred. Bredel, New York City ... 243
Chicago Retort and Firebrick Co., Chicago, Ills ... 242
J. H. Gautier & Co., Jersey City, N. J ... 243

GAS GOVERNORS.

Connelly & Co., New York City ... 239
Fred. Bredel, N. Y. City ... 243
Friedrich Lux, London, England ... 232

SELF-SEALING MOUTHPIECE DOORS.

Smith & Sayre Mfg. Co., New York City ... 246

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page, N. Y. City ... 236

CEMENTS.

C. L. Gerould & Co., Brooklyn, N. Y ... 242

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio ... 248

GAS METERS.

John J. Griffin & Co., Phila., Pa ... 250
American Meter Co., New York and Philadelphia ... 251
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 251
Heime & McIlhenny, Phila., Pa ... 251
D. McDonald & Co. Albany, N. Y ... 251
Nathaniel Tufts, Boston, Mass ... 250
Maryland Meter and Manufacturing Co., Baltimore, Md ... 231
Jones Meter and Stove Co., Royersford, Pa ... 250
Harris Bros. & Co, Philadelphia, Pa ... 250

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind ... 238
Smith & Sayre Manufacturing Co., New York City ... 246
Wilbraham Bros., Philadelphia, Pa ... 239
Connelly & Co., New York City ... 239

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 249
Perkins & Co., New York City ... 248
Despard Coal Co., Baltimore, Md ... 249
Chesapeake and Ohio R. R. Coal Agency, N. Y. City ... 249
Westmoreland Coal Company, Phila., Pa ... 249
J. & W. Wood, New York City ... 248

CANNEL COALS.

Perkins & Co., New York City ... 248
J. & W. Wood, New York City ... 248

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 231
John McLean, New York City ... 231
Chapman Valve Manufacturing Co., Boston, Mass ... 231
R. D. Wood & Co., Phila., Pa ... 246
The P. H. & F. M. Roots Co., Connersville, Ind ... 238

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 216
Clerk Gas Engine Co, Phila., Pa ... 249
Van Duzen Gas Engine Co., Cincinnati, Ohio ... 249

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass ... 239

STEAM PUMPS.

Van Duzen & Tift, Cincinnati, Ohio ... 231

GAS LAMPS.

Welsbach Incandescent Gas Light Co., Phila., Pa ... 233
The Siemens-Lungren Company, Philadelphia, Pa ... 233
Fiske, Coleman & Company, Boston, Mass ... 242

PURIFIER SCREENS.

John Cabot, New York City ... 232
Bartlett, Hayward & Co., Baltimore, Md ... 232

GAS STOVES.

American Meter Co., New York and Philadelphia ... 235
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 252
George M. Clark & Company, Chicago, Ills ... 232
D. McDonald & Co., Albany, N. Y ... 251
Maryland Meter and Manufacturing Co., Baltimore, Md ... 231
Jones Meter and Stove Co., Royersford, Pa ... 250
Chicago Gas Stove Company, Chicago, Ills ... 232
Dangler Stove and Mfg. Co, Cleveland, Ohio ... 232

STREET LAMPS

J. G. Miner, Morrisania, New York City ... 197
Bartlett Street Lamp Man'fg Co., New York City ... 233

BURNERS.

C. A. Gefrorer, Phila., Pa ... 248
Moses G. Wilder, Phila., Pa ... 233

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City ... 231

PURIFYING MATERIAL.

Connelly & Co., New York City ... 239
Friedrich Lux, London, England ... 232

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 249

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City ... 247
Fort Wayne Electric Co., Fort Wayne, Ind ... 240

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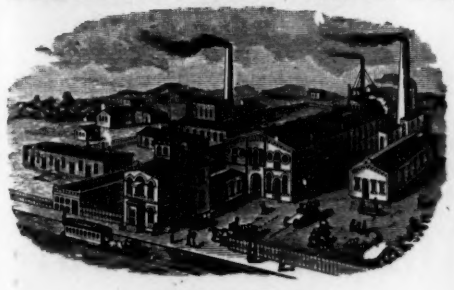

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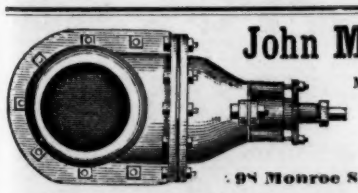

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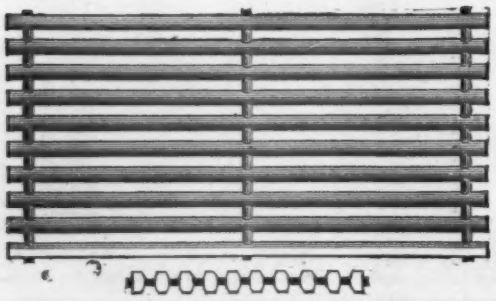

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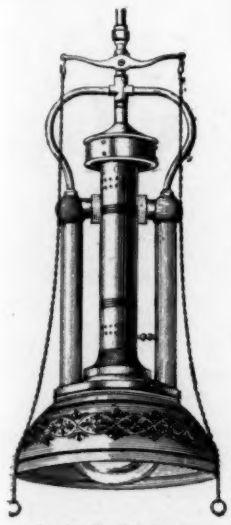
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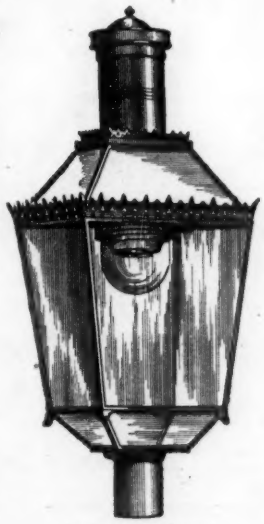
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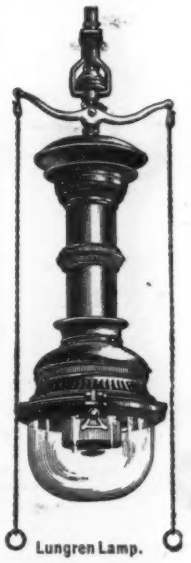
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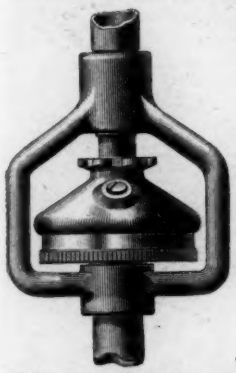

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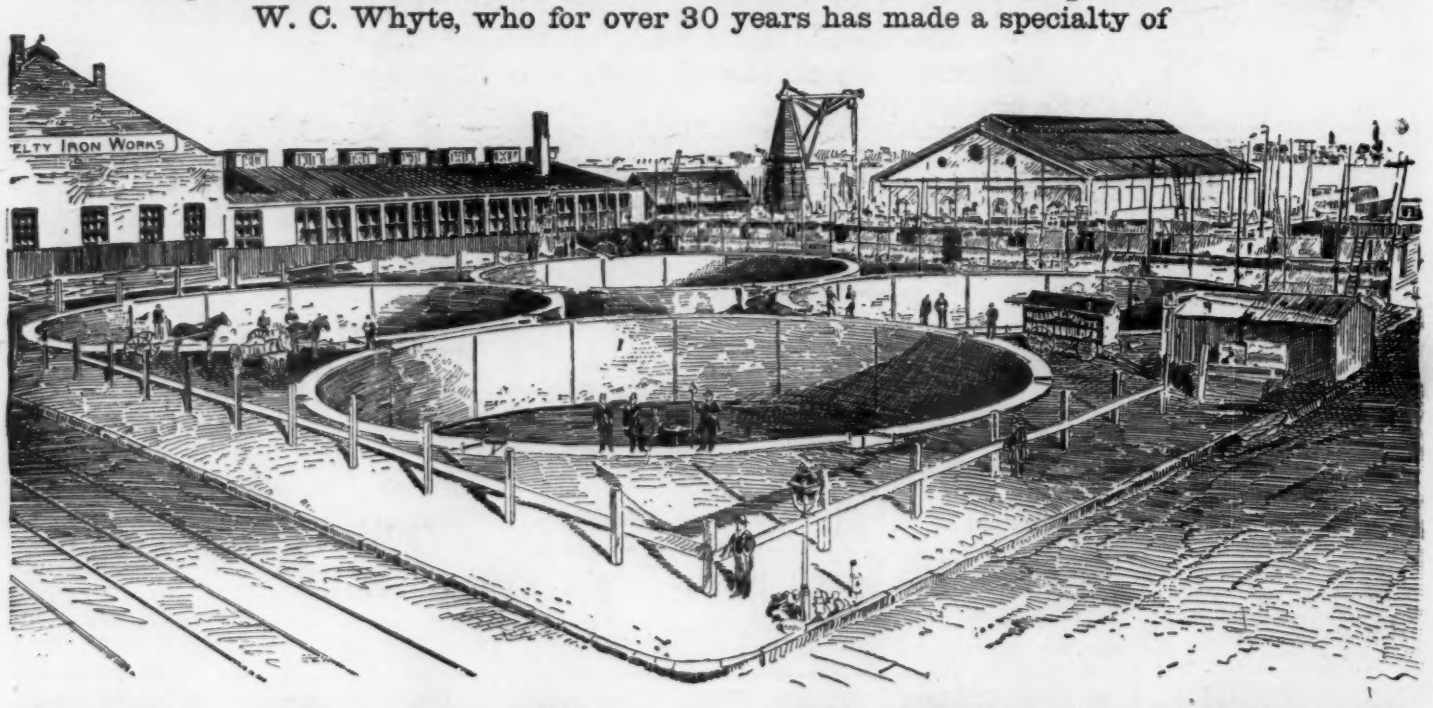

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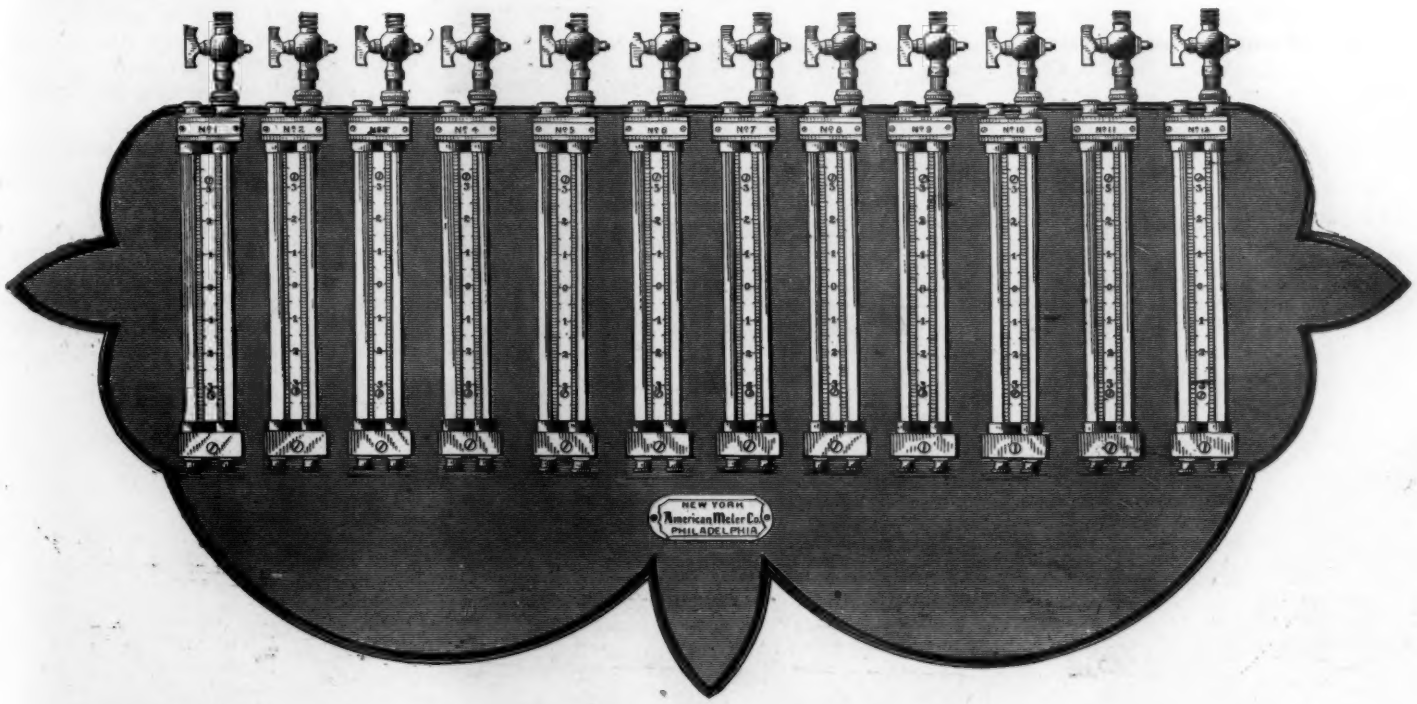

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The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fi ted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledon Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, of the Dundalk Gas Works. All of the foregoing gas works are located in Great Britain.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It would be manufactured in the following sizes:

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No. 2,	"	"	125,000	"	"	"	4	"	"	" "
No. 3,	"	"	250,000	"	"	"	5	"	"	" "
No. 4,	"	"	500,000	"	"	"	6	"	"	" "
No. 5,	"	"	750,000	"	"	"	7	"	"	"
No. 6,	"	"	1,000,000	"	"	"	8	"	"	"
No. 7,	"	"	1,250,000	"	"	"	9	"	"	" "
No. 8,	"	"	1,500,000	"	"	"	10	"	"	" "
No. 9,	"	"	2,000,000	"	"	"	12	"	"	" "
No. 10,	"	"	3,000,000	"	"	"	15	"	"	" "

This Tar Extractor will perform its work with about one-fourth the usual back-pressure heretofore required. It is simple in construction, and can be supplied at a very reasonable price—less than any other ever before introduced. Satisfactory results will be guaranteed in every instance.

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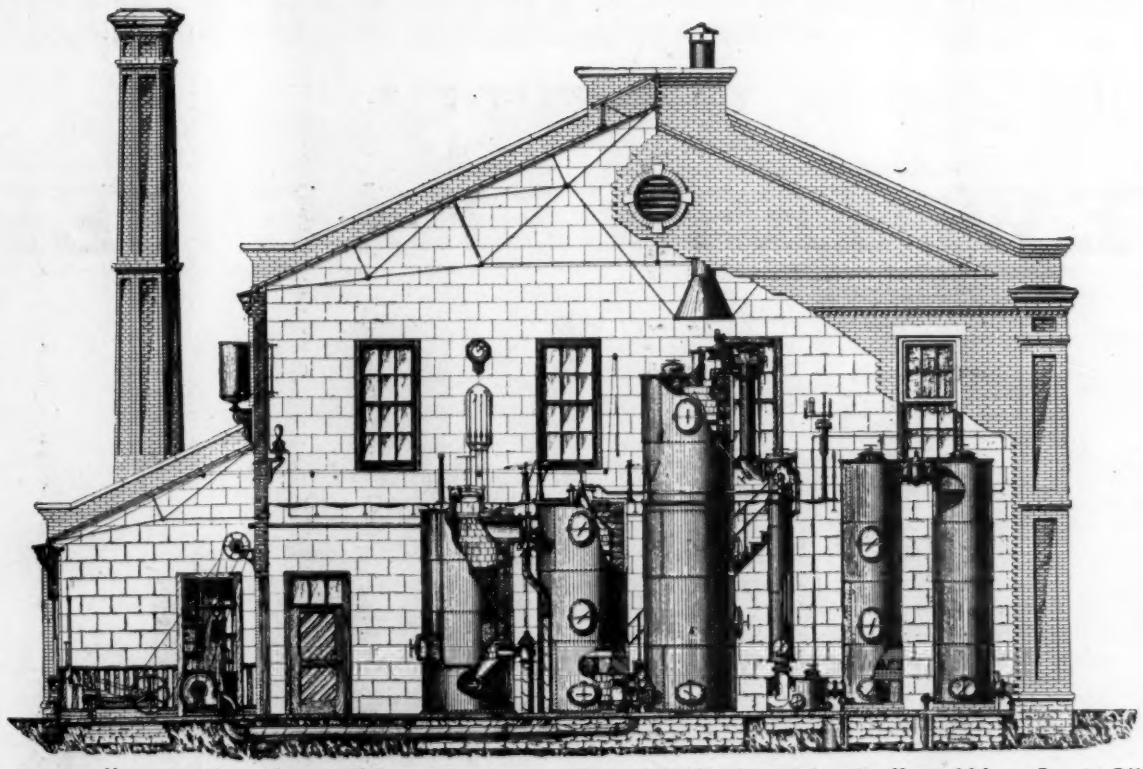

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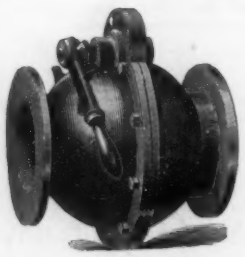

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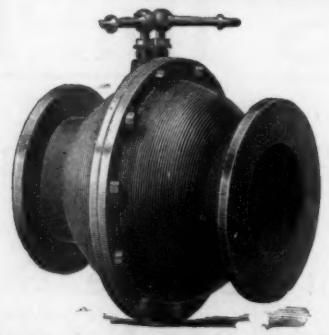

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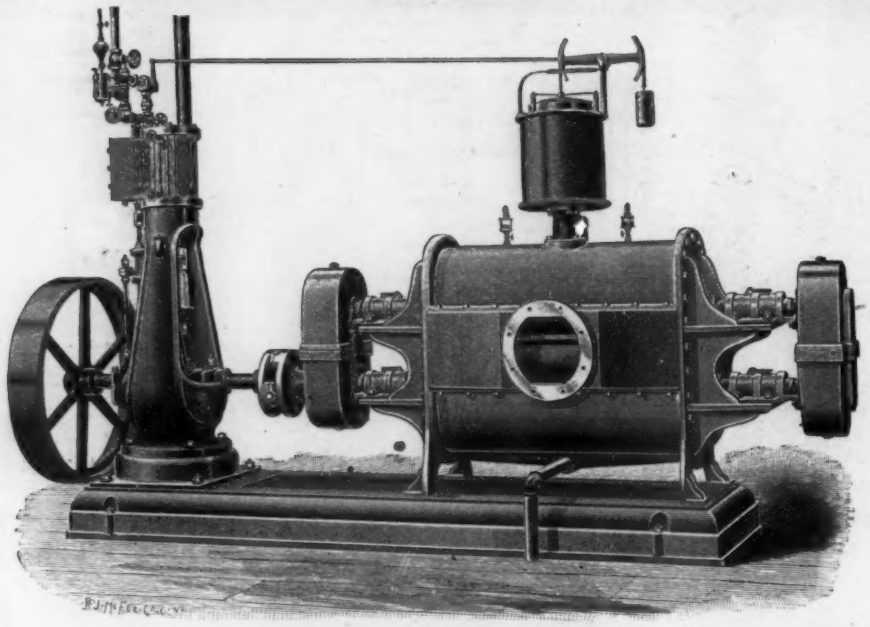

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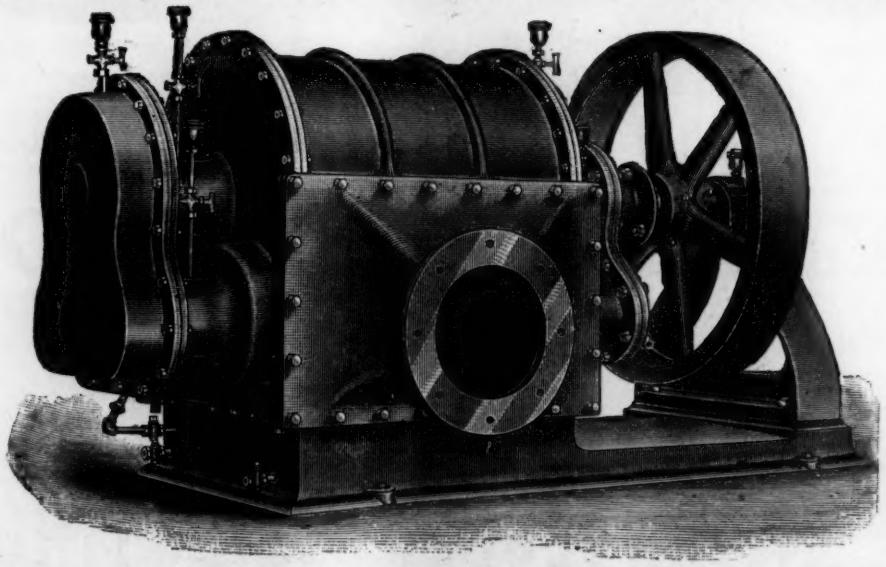

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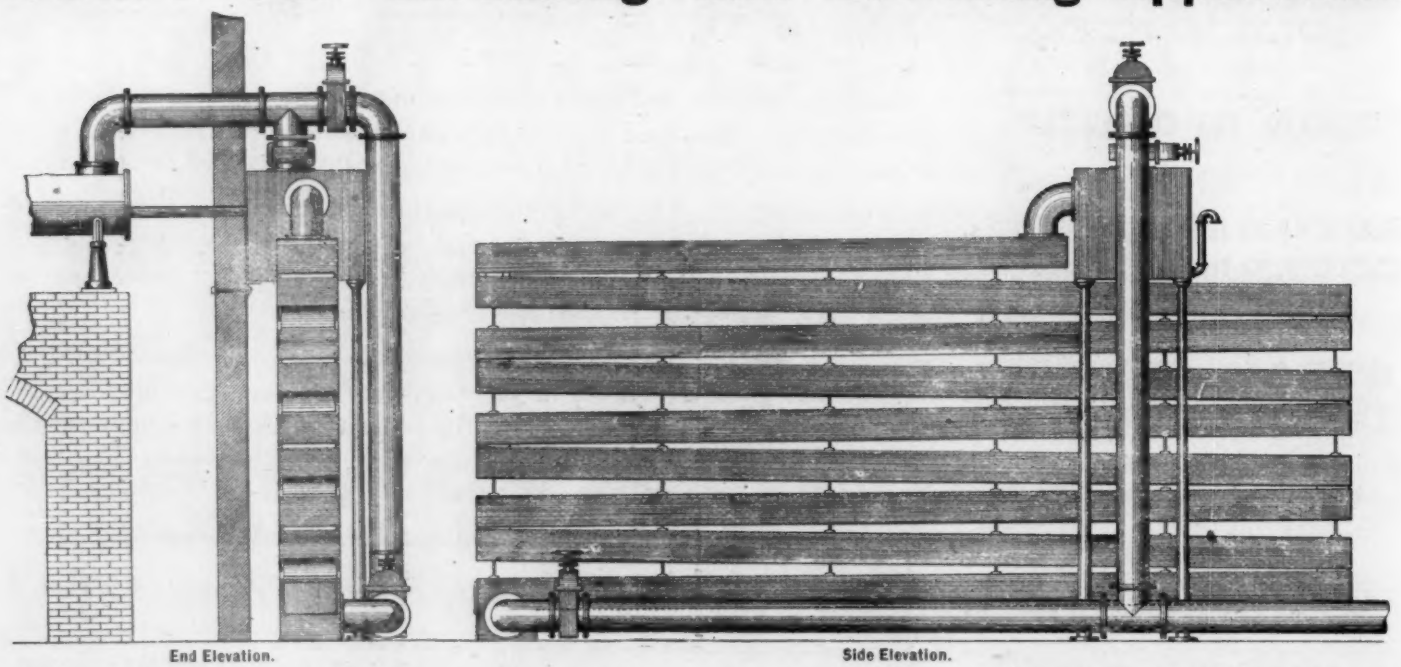

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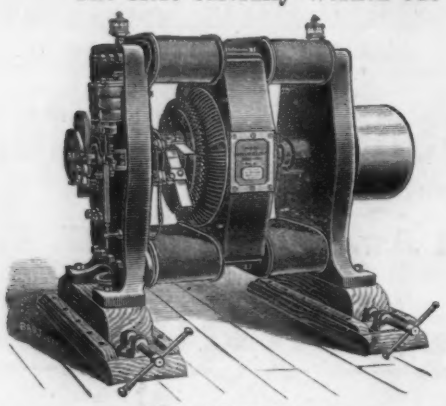

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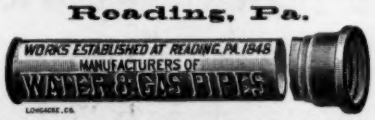

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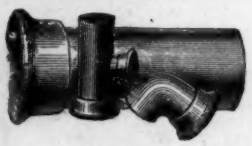

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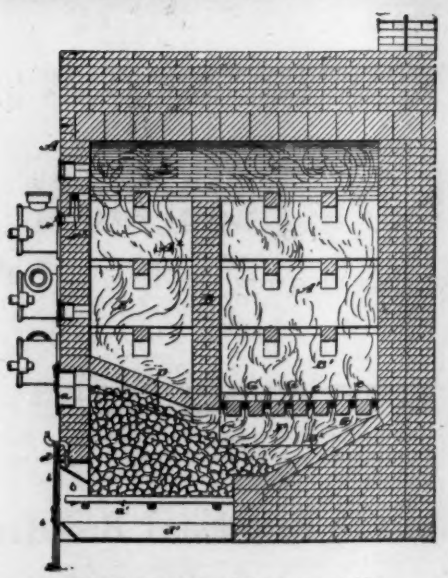

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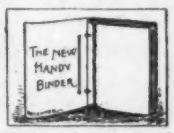

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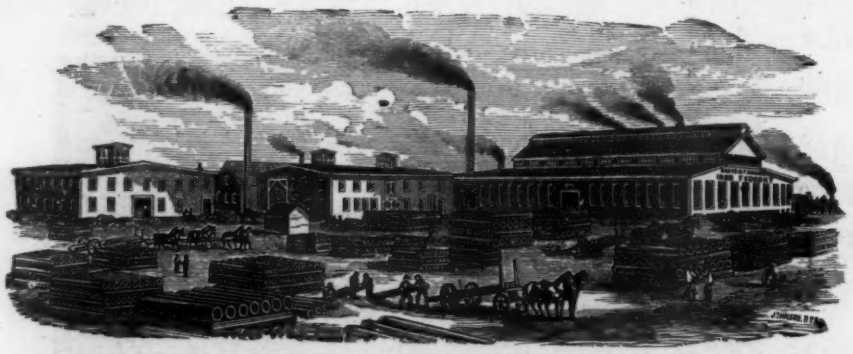

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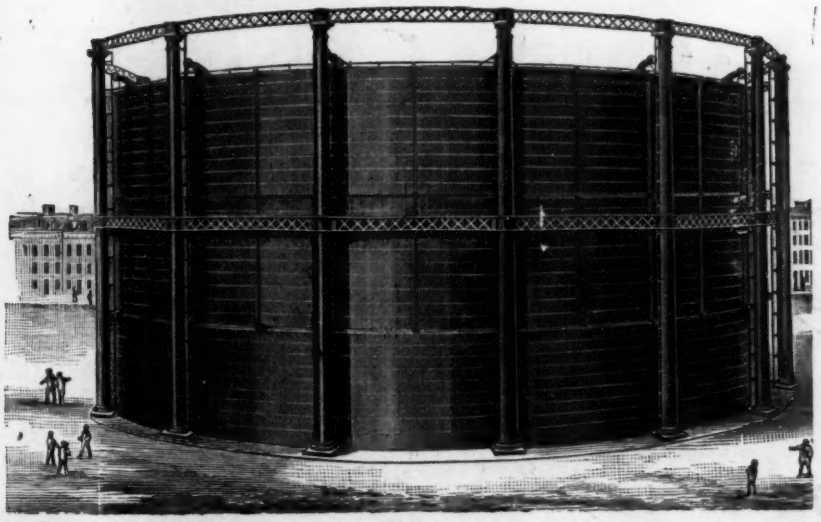

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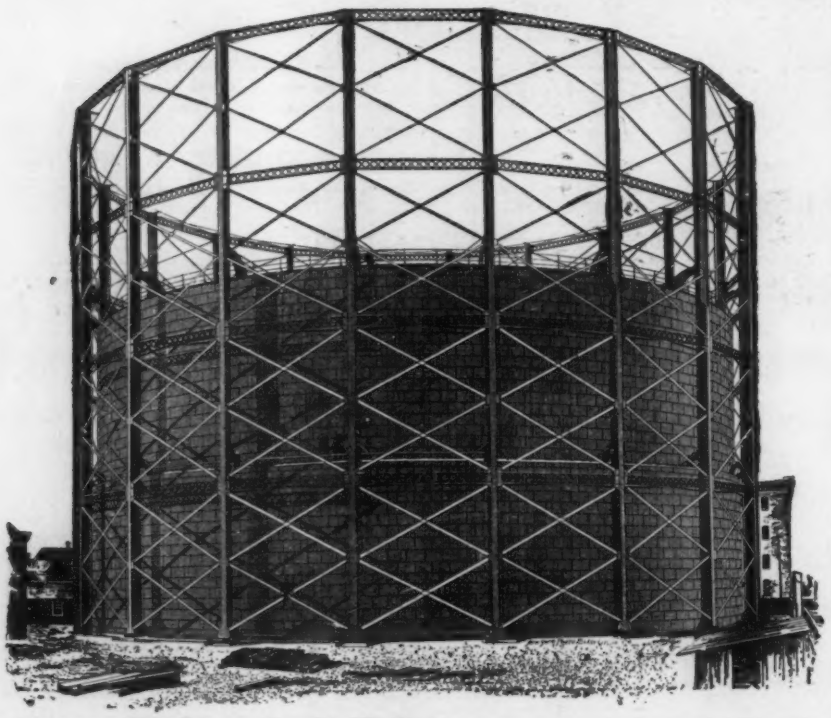

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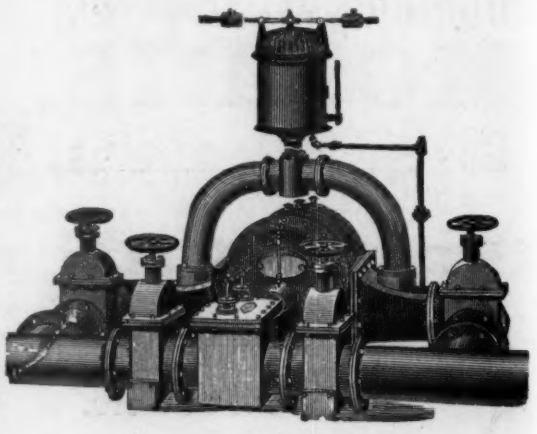

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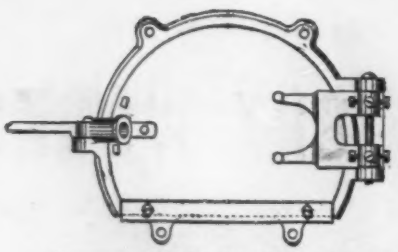

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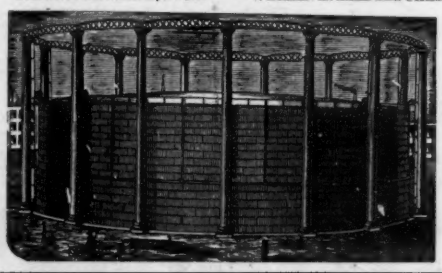

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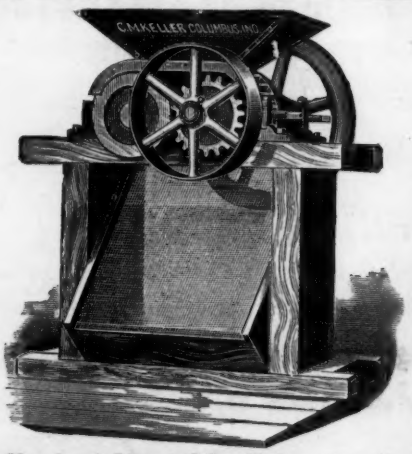

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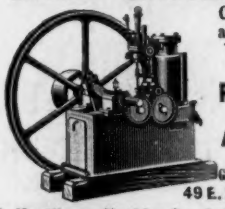

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WET AND DRY GAS METERS. STATION METERS, EXPERIMENTAL METERS, METER PROVERS,

Center Seals, Pressure Registers, Governors, Indicators, Photometers, and all other kinds of Apparatus for use in Gas Works.

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REPAIRING DEPARTMENT.—We employ a special force of skilled workmen repairing meters of **all makers.**

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Station Meters (square, cylindrical, or in staves), Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, etc., etc. Meter Provers (sizes 2, 5, and 10 feet), Pressure Gauges of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4, 6, and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Center Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete. Also, Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Manufacturers of the "SUN DIAL" GAS STOVES, for Cooking and Heating.

Goodwin's Improved Lowe's Jet Photometer. **Agents for Bray's Patent Gas Burners and Lanterns.**

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Also STAR GAS STOVES, RANGES, and HEATING STOVES.

We use only the very best materials, and employ the most skilled labor, and by our long experience (36 years) and personal supervision of every detail, we feel justified in assuring the public that our goods will give perfect satisfaction. Every Meter emanating from our establishment will bear the State Inspector's BADGE, and will be fully warranted by us. Our Annual and Calendar will be sent to Gas Companies upon application.

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Agents, WALDO BROTHERS, 88 Water Street, Boston.

SOLE MANUFACTURERS OF THE

"SUN DIAL" GAS STOVES,

The Most Economical, Efficient, and Durable Gas Stove Made.

GAS COOKING STOVE, No. 8 C.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
37 in. high.	12 in. high.	12 in. high.	24 in. long.	36 in.
20 in. wide.	17½ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

All Fittings are Nickel-Plated.

GAS COOKING STOVE, No. 7 B.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
31 in. high.	9½ in. high.	10 in. high.	21 in. long.	32 in.
17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

All Fittings are Nickel-Plated.

"RADIANT" BOILING STOVE, WITH REGENERATIVE BURNER.

Size, 6¼ inches diameter, 8 inches high. Consumption, 6 feet per hour at 1 in. pressure.

HOT PLATE, No. 111.

Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

Consumption, with all burners in use, 36 cubic feet per hour, with 1 in. pressure.

¾ in. supply pipe should be used where the pressure is 1 in. or over.